VOL. XIX, No. 4 CHICAGO, January 26, 1911 $3.00 PER YEAR

MOTOR AGE

UNCLE SAM—HIS SHOW

CHICAGO, Jan. 25—On Saturday of this week the tenth national motor car show under the auspices of the National Association of Automobile Manufacturers opens in this city at the Coliseum. As in former years this will be what has come to be known as the open door show in that the lines are not drawn between licensed and independent cars. Since the inception of the Chicago national show all classes have met side by side and during the several years that there have been two shows in New York there has been but one in Chicago.

The show this year gives promise of being greater than any of the previous ones because of the greater list of exhibitors. As usual, there has been a waiting list of applicants for space in either the First Regiment armory or in the Coliseum. But those who cannot get in will have ample opportunity of displaying their wares at the different places along Michigan avenue, which is the motor row par excellence of the world. Already every vacant store along the avenue from Twelfth street south to the First Regiment armory has been taken, and many are still looking for locations. The corridors of all the hotels have been taken possession of by different companies.

Along Wabash avenue, opposite the main entrance of the Coliseum, there will be a continuous motor mart and many companies that have not been able to secure locations are going to carry on a curb

stone campaign with the demonstrators right on the spot.

It is the car, however, that will be the magnet with those who come to the show and on this and the following page are given the average cars for last year and also for this year, in four classes, namely, $1,000, $1,500, $2,500 and $4,000. These prices cover ranges from $1,000 to $1,250 in case of the $1,000 car; from $1,250 to $1,800 on the $1,500 car; from $1,800 to $3,000 in the $2,500 class, and from $2,800 to any figure in the $4,000 class. It will be seen then that these figures represent the four big logical classes into which the car field can be divided today.

Four Grand Classes

By looking at the entire industry, divided into these four grand classes, it will be possible to intelligently compare the four typical average cars of last year with those of this year. On this page are printed all the details of the four average cars of 1910 and on the opposite page are the corresponding specifications of the cars for this year. Bringing them together in this way permits of endless comparisons. A few will be made in the following paragraphs:

Glancing at the horsepower it shows that there has been an increase in the horsepower in the $1,000, $1,500 and $2,500 cars, but a dropping off in the $4,000 car. These figures show pretty accurately the public demands. There has been a demand for more power in the lower-priced machines. In many of these the price has been a big factory, and while a year ago it was a case of see how much horsepower could be given for a certain price, it often was a case of see how big a body could be given with that price. The result was that many cars had too much body. For this reason this abuse has been rectified.

Craze for Power Abates

In the case of the $4,000 car dropping off in horsepower it would seem to indicate that there has been too much power in some of the higher-priced machines. This may have been due to the great demand for speed a year ago. This foolish demand is ceasing and now an owner sooner would have a car well proportioned with power and body than an abnormal creation that had too much motor and not enough power.

1910

THE AVERAGE AMERICAN CAR

Average	$1,000 Car	$1,500 Car
Wheelbase, inches	96	109
Front wheel, inches	30.9x3.1	33.3x3.5
Rear wheel, inches	30.9x3.1	33.3x3.5
Price of car	$867	$1,413
Average	**$2,500 Car**	**$4,000 Car**
Wheelbase, inches	114	124
Front wheel, inches	33.9x4.3	35.6x4.3
Rear wheel, inches	34.2x3.9	35.7x4.5
Price of car	$2,162	$3,850

	$1,000 Car	$1,500 Car	$2,500 Car	$4,000 Car
MOTOR—				
Number of Cylinders				
One, Pct.	2.7	..	..	..
Two, Pct.	29.9	4.8	1.3	..
Four, Pct.	67.4	93.5	89.1	61.1
Five, Pct.	..	..	..	2.6
Six, Pct.	..	1.7	9.6	36.3
Average bore, inches	3.92	4.17	4.32	4.76
Average stroke, ins.	4.25	4.46	4.43	5.13
Average A. L. A. M., horsepower	19.3	28	31.1	45.4
Piston displacement	169.2	234.7	294.6	487.4
T type, Pct.	7.6	9.8	19.1	41.1
L type, Pct.	87.4	82.2	58.3	35.3
Valve-in-head, Pct.	5	8	11.3	20.9
Two-cycle, Pct.	..	..	11.3	2.7
Cyl., separate, Pct.	56.9	54.9	36.7	34.3
Cyl., in pairs, Pct.	7.7	24.3	56.7	65
Cyl., en bloc, Pct.	35.4	20.8	6.6	.7
Cyl., in threes, Pct.	..	..	..	..
Air-cooled, Pct.	8.2	6.6	4.7	4.9
Water-cooled, Pct.	91.8	93.4	95.3	95.1
Thermo-syphon, Pct.	66.9	35.5	20.9	4.9
Pump cir'lating, Pct.	24.9	57.9	74.4	90.2
Tubular Radi'or, Pct.	..	..	..	..
IGNITION—				
High-ten. sing., Pct.	63	22.5	27.6	10.5
High-ten. dual, Pct.	27	42.2	32.4	45.8
High-ten. doub., Pct.	10	35.3	38.6	38.7
Make-and-br'k, Pct.	..	..	..	3.5
Low-ten. sin., Pct.	..	..	1.4	1.5
CARBURETER—				
Gravity feed, Pct.	100	87.3	90.3	60.3
Pressure feed, Pct.	..	12.7	9.7	39.7
LUBRICATION—				
Comp'sion oiler, Pct.	3	2	..	..
Cir'lating pump, Pct.	62	75	66	64
Gravity pump, Pct.	8	7	1	..
Mech'ical oiler, Pct.	16	11	23	36
Cir'lating flyw'l, Pct.	11	5	10	..
CLUTCH—				
Multiple disk, Pct.	54	48	46	47
Cone, Pct.	38	47	33	41
Internal band, Pct.	3	2	12	4
External band, Pct.	..	..	8	5
None, Pct.	5	3	1	3
GEARSET—				
Selective, Pct.	33	68	93	94
Two speeds, Pct.	58	..	..	..
Three speeds, Pct.	42	100	95	80
Four speeds, Pct.	..	..	5	20
Progressive, Pct.	16	7	5	4
Two speeds, Pct.	95	90	..	..
Three speeds, Pct.	5	10	100	100
Planetary, Pct.	46	25	1	..
Two speeds, Pct.	90	100	..	..
Three speeds, Pct.	10	..	..	..
Friction, Pct.	5	3	1	2
DRIVE—				
Shaft, Pct.	82	88	97	92
Chain, Pct.	18	12	3	8

1911

THE AVERAGE AMERICAN CAR

Average	$1,000 Car	$1,500 Car
Wheelbase, inches	99¾	114
Front Wheel, inches	31.5x3.25	33.1x3.8
Rear Axle, inches	31.5x3.25	33.1x3.8
Price of Car	$966	$1,635
Average	**$2,500 Car**	**$4,000 Car**
Wheelbase, inches	119	124
Front Wheel, inches	35 x4	35.8x4.3
Rear Axle, inches	35 x4.1	36.7x4.6
Price of Car	$2,490	$4,265

MOTOR—	$1,000 Car	$1,500 Car	$2,500 Car	$4,000 Car
Number of Cylinders				
One, Pct.	2.7	.....	.....	.....
Two, Pct.	21	.....	.....	.....
Three, Pct.	1.3	.....	.....	.....
Four, Pct.	75	96	89	65
Five Pct.	.....	.....	.....	2
Six, Pct.	.....	4	11	33
Average Bore, Inches	4.01	4.19	4.43	4.88
Average Stroke, Ins.	4.21	4.64	4.88	5.39
Average A. L. A. M. Horsepower	21.23	28.53	35.6	43.7
Piston Displacement.	185.9	26.20	324.2	467.3
T Type, Pct.	11	11	28	34
L Type, Pct.	63	69	56	37
Valve-in-head, Pct.	20	18	14	27
Two Cycle, Pct.	6	2	2	2
Cyl., separate, Pct.	40	21	29	19
Cyl. in Pairs, Pct.	33	60	67	79
Cyl. enBloc, Pct.	27	19	4	1
Cyl. in Threes, Pct.	.....	.....	.....	1
Air-Cooled, Pct.	15	3	2	4
Water-Cooled, Pct.	85	97	98	96
Thermo-Syphon, Pct.	61	85	3	5
Pump Cir'lating, Pct.	39	15	97	95
Tubular Radi'or, Pct.	81	75	46	36
Cellular Radi'or, Pct.	19	25	54	64
IGNITION—				
High-Ten. Sin., Pct.	38	16	10	7
High-Ten. Dual, Pct.	49	66	50	50
High-Ten. Doub., Pct.	13	18	40	41
Make-and-Br'k, Pct.	..	..	..	2
CARBURETERS—				
Gravity Feed, Pct.	96	93	75	60
Pressure Feed, Pct.	4	7	25	40
LUBRICATION—				
Comp'sion Oiler, Pct.	1	..	..	..
Cir'lating Pump, Pct.	68	90	84	68
Gravity Pump, Pct.	..	..	..	2
Mech'ical Oiler, Pct.	26	6	13	26
Oil fed with fuel, Pct.	1	..	..	..
Cir'lating Flyw'l, Pct.	4	4	3	4
CLUTCH—				
Multiple-Disk, Pct.	49	47.5	40	54
Cone, Pct.	40	44	50	30
Internal Band, Pct.	..	0.5	5	5
External Band, Pct.	..	..	5	10
Dry Segments, Pct.	..	..	..	1
None, Pct.	11	8	..	..
GEARSET—				
Selective, Pct.	71	91	98	99
Two Speeds, Pct.	18	..	..	..
Three Speeds, Pct.	82	99.5	89	58
Four Speeds, Pct.	..	0.5	11	42
Progressive	8	1	2	1
Two Speeds, Pct.	..	..	..	..
Three Speeds, Pct.	..	100	100	100
Four Speeds, Pct.	..	..	..	..
Planetary, Pct.	8	..	..	..
Two Speeds, Pct.	80	..	..	..
Three Speeds, Pct.	20	..	..	..
Friction, Pct.	13	8	..	..
DRIVE—				
Shaft, Pct.	80	91	100	94
Chain, Pct.	19.5	9	..	6
Direct Pct.	0/.5	..	..	..

The length of wheelbase has always been a debatable one and figures show that three average cars have grown a little in this respect in the last 12 months. The extra space has in nearly every case been utilized to give more foot room in the tonneau. The $1,000 car's wheelbase has jumped from 96 to 100 inches; the $1,500 from 109 to 114 inches; the $2,500 car from 114 to 119 inches, and the $4,000 car remains at 125 inches. This shows a growth all along the line, but most pronounced among the medium-priced machines and not so noticeable in the cheap and in the expensive cars. The $4,000 car has not lengthened 1 inch, which shows that practically the desired body requirements have already been obtained in the high-priced machine of today.

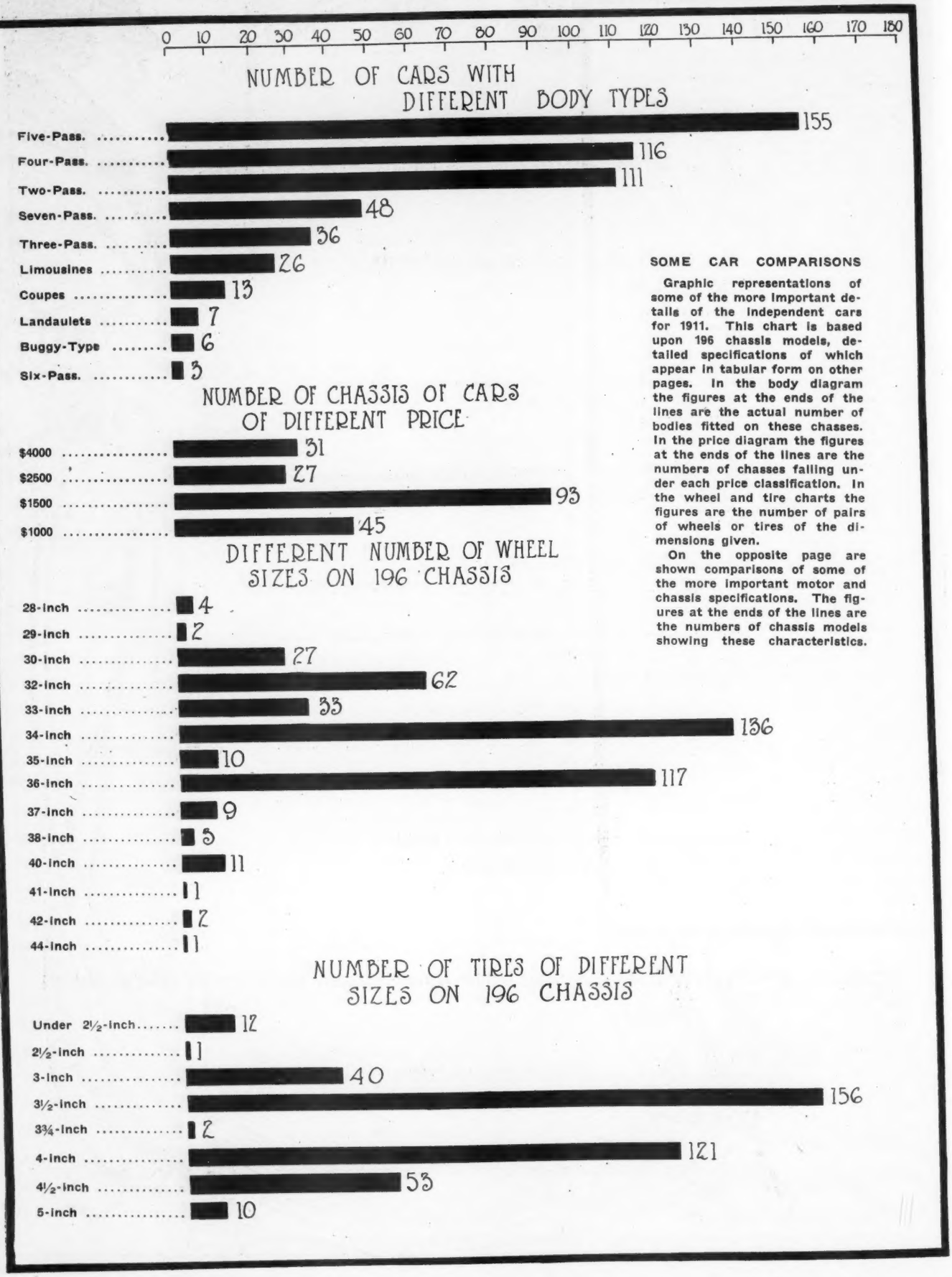
Tire Sizes Increased

Many people contend that cars are under-tired, that is the tires are too small for the motor power and the car weight. To these there is a message of good cheer. In three classes the tire sizes have grown a little, not much in some of them, but a little growth, excepting in the $1,500 class, which shows a reduction all along the line. This has undoubtedly been brought about by the big rivalry in this class in which every maker is trying to outdo the other in the amount of car he gives for the money. In the $1,000 class the sizes have jumped from 30.9 to 31.5. This is not much, but a little, and every little bit helps. The diameter has not been increased. In the $1,500 car the tire size has been reduced a little more than ¼ inch. In the $2,500 car the increase all around is approximately 1 1-10 inches, which is a very big jump. In the big cars the increase is over 1 inch on all four wheels.

L Cylinder Heads

The features of construction can be gleaned by a cursory glance of both tables. The L cylinder is a leader; it is a close struggle between tubular and cellular radiators; multiple-disk clutches are gaining; the dual ignition is today a leader; the selective gearset is paramount; and shaft drive is used on all but one or two large make of cars and some of the friction-driven types. Thermo-syphon water circulation is used on the lower priced machines, but the pump is used exclusively on the higher priced ones.

Chart Showing General Body, Wheel and Tire Status

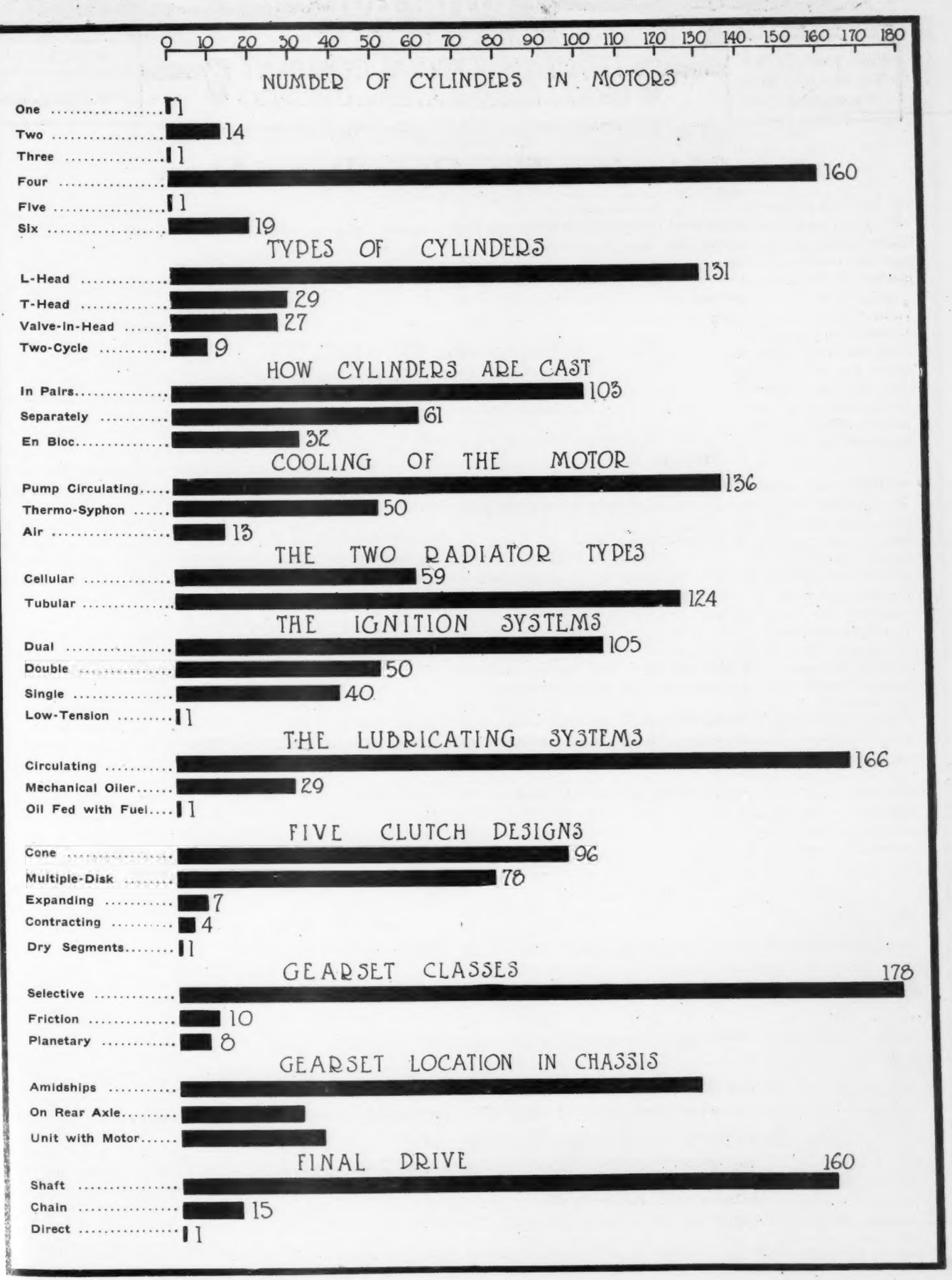


SOME CAR COMPARISONS

Graphic representations of some of the more important details of the independent cars for 1911. This chart is based upon 196 chassis models, detailed specifications of which appear in tabular form on other pages. In the body diagram the figures at the ends of the lines are the actual number of bodies fitted on these chasses. In the price diagram the figures at the ends of the lines are the numbers of chasses falling under each price classification. In the wheel and tire charts the figures are the number of pairs of wheels or tires of the dimensions given.

On the opposite page are shown comparisons of some of the more important motor and chassis specifications. The figures at the ends of the lines are the numbers of chassis models showing these characteristics.

Tendencies of the Independent Pleasure Cars for 1911



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Chicago—The Open-Door Show

THE end of this week the big national motor car show of the year opens in the Coliseum of Chicago. This is the only truly national show of the year, because, since its inception, this show has been open to all classes of makers, whether belonging to the Selden, the independents, or any other organization. The Chicago national show has always been the open-door proposition of the entire show circuit. The National Association of Automobile Manufacturers, which association conducts the show, has not drawn any lines that would even suggest a division of the industry. The policy has been one show to all. This show policy has taken well with the thousands of western dealers who annually come Chicagoward to see what is the latest that the engineers of the land have to offer in the way of improvements for this year over the designs of the past season.

THERE are many reasons why the one big open-door show appeals to the public. It is a law of the mind that men grasp generalities first and after that go to particulars. In accordance with this law, having all of the different makes of cars in the country brought side by side the visitor has a chance of really arriving at a definite idea as to the present status of the industry. Where he has to go to two or three shows in order to get such a conception, the amount of labor involved is vastly greater and in the end the conception is not so clear or accurate as where all are side by side. To get a definite conception of the 1911 car it is first necessary to examine the different makes, and how can these be examined unless they are brought side by side? After each has been examined the mind hurries on to the process of comparison, that is, contrasting the different features of one machine with those of another. When the comparison process has been completed the mind takes up the problem of abstraction, that is, abstracting from the different makes the characteristics and, lastly, unifying these varied abstractions and building out of them what can be designated as the complete and whole car of today. These are the invariable mental processes that must be passed through, and it is impossible to pass through all of them unless the cars are brought side by side as afforded in the Chicago show.

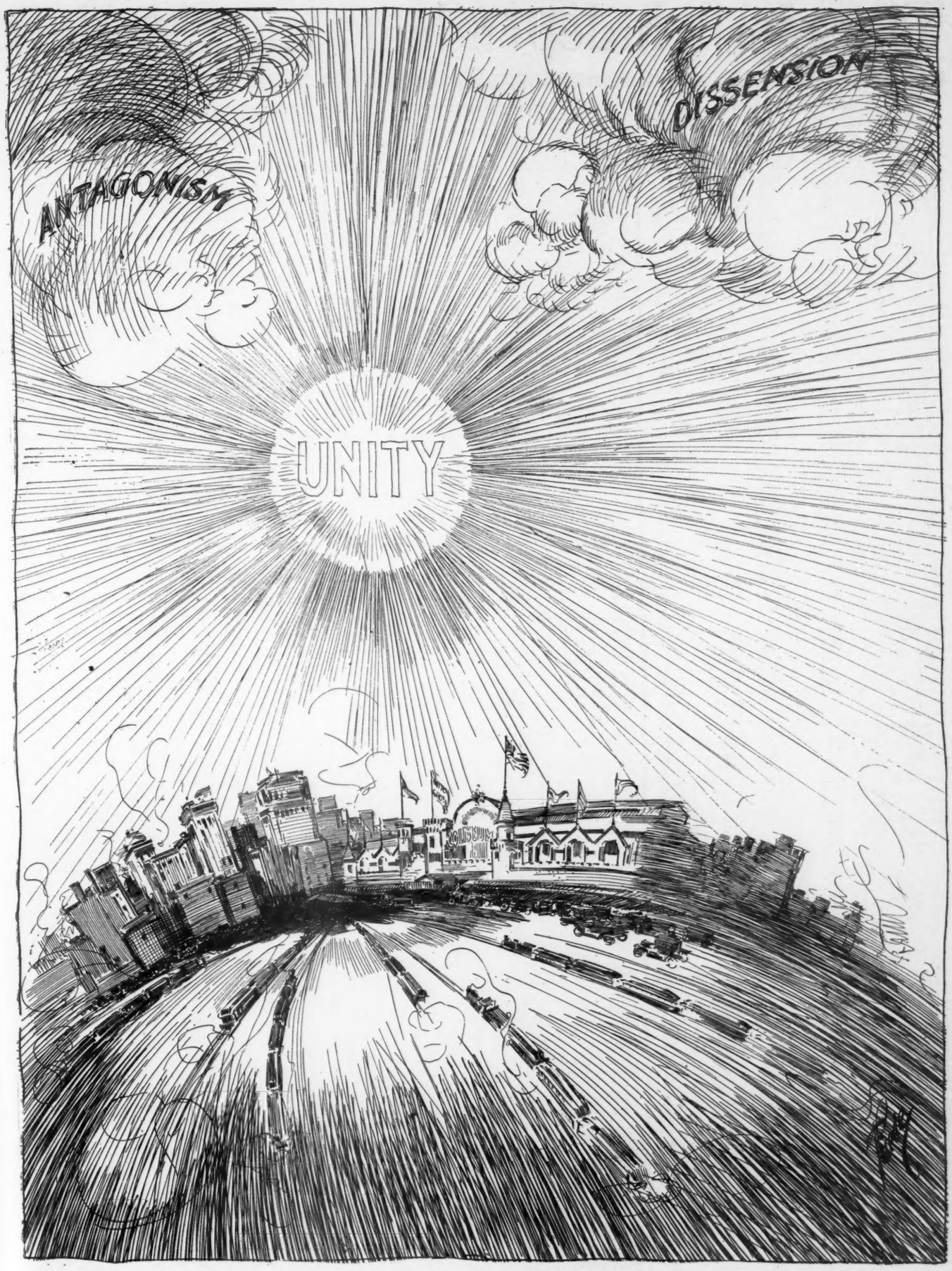
AT every Chicago show there are almost scores of cars that cannot be shown in the Coliseum or armory, and this year, as the previous ones, the outside show will prove most attractive because it will be made up of many new concerns that are making big strides in the industry and are doing much to popularize certain phases of construction that the old-time makers have hesitated to take up. In the motor industry, like in many other kindred industries, it is the new maker that does much development along new lines. With him he has a new product and he must have some talking points. He looks over the best that has been brought out and combines with that many of the most advanced ideas of construction as practiced in foreign shops. He has nothing to lose and everything to gain in this work. The old time maker is differently situated. He is backed up by a reputation extending over several years and he hesitates about bringing out anything new until he has incorporated it into a test chassis and has tried it out, in many cases more than a year. He cannot afford to make a mistake and he would much sooner err on the side of conservatism than make a blunder by bringing out something new but which he has not thoroughly tried out and which he would have to drop or change after a year or less of use. It is because of this particular situation that the new maker is a quantity in the industry that must not be overlooked.

FREQUENTLY the new maker is an experimentalist, that is, one who is trying the industry; who proposes seeing if the prospects of big dividends are as great as reputed. This type of new maker is not so much in evidence now as a year ago. One year ago the wildcatting business was at its height, but not so now. The industry has changed very perceptibly since then, and many of the wildcatters at that time have now ceased to be and a few of those who still linger will soon be but history. It is, then, from the point of view of the newcomer a most interesting period in the industry. There are several new concerns that are in the industry to stay, and it will not be surprising if in another year or 2, or perhaps 3, that some of these newcomers have become the big quantities. It is an old story that new blood is good for any business, and although the motor industry is very young, it nevertheless is in need of new blood in many quarters at the present moment. There are not a few mouldering branches that the sooner they are lopped off the better, and there is some excellent new blood that is bound to show itself within a year or two.

IT is for these reasons that the open-door Chicago show is such a popular one. It is deep-rooted in the mind of the citizen of the central west and the west, that the land is a very broad and rich one and that there is room enough for all. It is also deeply rooted in the minds of these same individuals that every man should have an equal chance and should be judged solely on his merits. It is, in short, a case of may the best man win. This is the rule that must hold good in the motor industry if it is to roll on to that great, glorious goal of ultimate perfection. Where stringencies hold one party down and push another up, it is all right if those stringencies are along the normal channels of business, but where there are other stringencies, promoted by individual or other aims, then they should be broken down.

FROM this it must not be inferred that all new blood is good blood. There have been some recent ventures in the motor business in which the concerns have been mere parasites living on the body corporate. They have never intended to play the game fair, but only aimed to get as much as possible and unload as poor a product on the public as it was possible. There have been several of such makers. There are always several of them in each new industry, where the possibilities of big profits are in sight of all. Fortunately such are short lived. While they exist they do much injury to the industry and after they have ceased to be the memory of their bad deeds proves a stench. Such cannot be stopped.

ONE of the great values of the Chicago show is the advertisement to the industry, and it would be a greater advertisement if more exhibitors were allowed to get inside the Coliseum and armory spaces. At present the spaces for exhibiting cars are too large and the number of makers exhibiting too few. The spaces should be cut in two. Let each concern exhibit its chassis and not more than two other models. As it is today, some show six or seven models. Some of the valuable space they have should be given to others.



The Sun is Shining Upon Our Cause

The 521 Independent Car Models

THERE are 521 different models of cars built by manufacturers who are not members of the Association of Licensed Automobile Manufacturers, and who up to the time of the recent Selden decision have been labelled the independents. Five hundred and twenty-one models does not mean 521 different chassis, but 521 different body models. Some concerns have as many as five different bodies on the same chassis with the same wheelbase and same tires.

Compared with the A. L. A. M. list, the independents are a little behind in that there are 542 A. L. A. M. body types. This is a small majority—only twenty-one. Forgetting that there are two, or at least have been two, divisions of the great motor industry, and looking upon the entire American field as a unity, there is a grand total of 1,063 different body types for the fastidious public to select from during the 1911 season. Speaking in the averages,

FIVE-PASSENGER CARS

NAME	CHASSIS MODEL	PRICE	REMARKS	Table No.
Abbott-Detroit	B	$1,500	Touring	1
Adams	C	2,000	Fore Door	2
Adams	C	2,000	Torpedo	2
Adams	C	1,800	Touring	2
Alpena	A	1,450	"	4
Alpena	A	1,600	Fore Door	4
Ar Benz	30-40	1,700	Torpedo	5
Auburn	L	1,400	Touring	6
Auburn	Y	1,700	"	7
Auburn	Y	1,750	Fore Door	7
Austin	45	3,000	Det. Fore D	8
Austin	50	3,750	"	9
Austin	60	5 750	"	10
Babcock	F	2,750	Fore Door	11
Badger	B	1,250	Touring	12
Badger	D	1,500	"	14
Belden	A	6,000	Torpedo	15
Belden	B	4,500	"	16
Bergdoll	C	1,500	Touring	17
Bergdoll	C	1,600	Fore Door	17
Berkshire	E	2,800	Toy Ton	19
Berkshire	E	2,900	Torpedo	19
Black-Crow	13	1,300	Touring	21
Black-Crow	15	1,500	Fore Door	22
Black-Crow	17 & 20	1,750	"	23
Black-Crow	17 & 20	1,750	Touring	23
Carhartt	B-C-D-E	2,250	"	30
Carhartt	B-C-D-E	2,250	Fore Door	30
Carhartt	B-C-D-E.	2,250	Demi. Ton.	30
Carhartt	J	1,200	F re Door	31
Cavalier	C	1,350	"	32
Cavalier	C	1,250	Touring	32
Cino	.....	2 250	"	33
Cino	.....	2 500	Torpedo	33
Clark	A & B	....	Touring	34
Colburn	N	3,500	"	35
Colby	H	1,750	Fore Door	36
Colby	H	2,000	Torpedo.	36
Cole	30	1,650	Fore Door	37
Cole	30	1.600	Touring	37
Continental	.....	1 400	"	39
Crawford	35	....	"	43
Cunningham	H	3,500	Close Coup.	44
Cutting	A-30	1,375	Fore Door	45
Cutting	A-30	1,325	Touring	45
Cutting	B-40	1,350	Close Coup.	46
Cutting	B-40	1,500	Fore Door	46
Cutting	B-40	1,450	Touring	46
Cutting	50	1,650	"	47
Cutting	50	1,700	Fore Door	47
Dearborn	H	.....	Touring	49
De Tamble	G-H-J	1,150	"	50
De Tamble	G-H-J	1,200	Fore Door	50
Derain	O-4	4,000	Close Coup.	51
Diamond	I	1 600	Fore Door	52
Diamond	I	1 550	Touring	52
Diamond T	.....	3,500	Close Coup.	53
Enger	40	2,150	Torpedo	55
Enger	40	2,000	Touring	55
Falcar	N	1,850	"	56
Firestone-Col'mbs	86-C	....	"	58
Firestone-Col'mbs	66-C	....	"	59
Firestone-Col'mbs	66-C	....	Fore-Door	59
Ford	T	780	Touring	60
Fuller	A	1,650	"	62
Fuller	A-Spec.	2,000	"	63
G. J G.	.....	2,500	"	67
Great Western	40	1,600	"	71
Great Western	40	1 650	Semi. Torp.	71
Great Western	40	1,750	Torpedo	71
Grout	35	1,850	Touring	72
Grout	45	2,500	"	73
Halladay	G	1,250	"	74
Halladay	J	1,500	"	75
Halladay	40	1,800	Fore Door	76
Halladay	40	1,700	Roadster	76
Henry	40	1.750	Touring	79
Henry	40	1,800	Fore Door	79
Henry	40	1,850	Torpedo	79
Herreshoff	20-B	1,500	Touring	82
Imperial	30	1,350	Det. Ton.	84
Imperial	35-36	1,650	Touring	85
Imperial	42-3-4	1,500	"	86
Imperial	42-3-4	1,600	Semi.-Torp.	86
Imperial	50-51	2,000	Fore Door	87
Imperial	50-51	2,000	Det. Ton	87
Jenkins	1911	2,750	Touring	88
Johnson	30	1,500	Str. Line	89
Johnson	40	2,500	"	90
Klinekar	4-30	1,675	Touring	97
Klinekar	4-40	2,250	"	98
Klinekar	6-50	2,700	"	99
Koehler	A	1,650	Torpedo	101
Lexington	D	1,650	Touring	106
Lexington	D	1,650	Fore Door	106
Lexington	F	1,850	Touring	107
Lexington	F	1,925	Fore Door	107
Lion	.....	1.700	.....	108
Luverne	530	1,500	Touring	109
McFarlan	6	2,100	Fore Door	111
Marathon	M	1,500	Touring	113
Maytag	2-Cy.	1,150	"	115
Maytag	30	1,650	"	116
Maytag	30	1,750	Torpedo	116
Maytag	35	2,000	"	117

FIVE-PASSENGER CARS

NAME	CHASSIS MODEL	PRICE	REMARKS	Table No.
Maytag	35	$2,000	Touring	117
Michigan	C	2,200	"	119
Midland	K	2,250	Close-Coup.	120
Midland	L	2,000	Touring	121
Midland	L	2,100	Fore Door	121
Morse	D	4,000	Touring	122
Nance	11	1,900	Tourab't	124
Norwalk	35	1,600	Touring	125
Norwalk	35	1,700	Fore Door	125
Otto	Standard	2,000	Touring	129
Parry	37-48	1,350	"	134
Parry	37-48	1,750	Fore Door	135
Paterson	40	1,550	Touring	136
Paterson	40	1,600	Fore Door	136
Paterson	30	1,295	Touring	137
Pennsylvania	C	3,000	"	140
Pennsylvania	F	4,500	"	141
Petrel	45-55	1,500	"	145
Petrel	65-75	1,600	Torpedo	146
Pickard	E-F-G-H	875	Special	148
Pilot	B	1,850	Touring	149
Pilot	B	1,925	Fore Door	149
Pilot	D	1,500	Touring	150
Pilot	D	1,575	Fore Door	150
Primo	F-P-11	1,750	Touring	151
Rambler	63	2,175	"	153
Rambler	64	2,775	"	154
Rambler	64	2,775	Toy Ton.	154
Rambler	65	3,050	"	156
Reading	40	1,250	Touring	159
Roader	30	850	Demi-Ton.	161
Schacht	A A	1,385	Touring	163
Spoerer	D-A	2,000	"	166
Spoerer	C	3,000	Toy Ton.	167
Standard	L-N	2,000	Min. Ton.	168
Standard	L-N	3,000	Touring	168
Staver-Chicago	30	1,450	"	169
Staver-Chicago	35	1,650	"	170
Staver-Chicago	40	1,850	Fore Door	171
Velie	G	1,800	Touring	177
Velie	G	2,000	Fore Door	177
Victor	40	2,000	Vestibuled	178
Victor	40	1,750	Touring	178
Warren-Detroit	11	1,325	"	180
Warren-Detroit	11	1,500	Fore Door	181
Washington	C-40	2,250	Touring	182
Westcott	1911	2,000	"	185
W. F. S.	A	2,250	"	186
Zimmerman	Z-40	1,600	"	191
Zimmerman	Z-40	1,650	Fore Door	191

FOUR-PASSENGER CARS

NAME	CHASSIS MODEL	PRICE	REMARKS	Table No.
Abbott-Detroit	B	$1,650	Fore Door	1
Adams-Farwell	9	3,000	Road.	3
Alpena	A	1,450	Touring	4
Ar Benz	30-40	1,700	Torpedo	5
Auburn	Y	1,700	Det. Ton.	7
Austin	45	3,000	Det. Fore D	8
Austin	50	3,750	"	9
Austin	60	5,750	"	10
Bergdoll	Roadster	1,600	Toy Ton.	18
Black-Crow	10, 11, 12	1,100	Surrey	20
Black-Crow	10, 11, 12	1,150	Toura't	20
Cameron	16	1,100	Touring	25
Cameron	.....	1,000	"	27
Cameron	.....	875	Surrey	27
Cino	.....	2,250	Min. Ton.	33
Cino	.....	2,250	Roadster	33
Colburn	N	3,500	Toy Ton.	34
Colburn	N	3,500	Runabout	34
Cole	30	1,650	Toy Ton.	37
Correja	40	1,750	Gunboat	41
Crawford	30	.....	Roadster	42
Crawford	30	....	Touring	42
Crawford	35	....	"	43
Cunningham	H	3,250	Roadster	44
Cutting	A-30	1,240	Close Coup.	45
Cutting	A-30	1,450	Torpedo	45
Cutting	B-40	1,550	"	46
Cutting	50	1,750	"	47
Derain	O-4	4,000	Toy Ton.	51
Diamond-T	.....	3,500	"	53
Enger	40	1,875	Torpedo	55
Falcar	N	1,850	Toy Ton.	56
Fuller	A	1,650	Touring	62
Fuller	A Spec.	2,000	"	63
G. J. G.	.....	2,500	Gunboat	67
Great Western	40	1,600	Demi. Ton.	71
Grout	35	1,850	Ton'ette	72
Grout	45	2,500	"	73
Halladay	G	1,250	Touring	74
Halladay	G	1,150	Surrey	74
Halladay	J	1,540	Det. Ton.	75
Halladay	40	2,650	"	76
Halladay	50	2,650	Roadster	77
Havers	6	1,500	Torpedo	78
Henry	40	1,750	Demi. Ton.	79
Henry	40	1,800	Fore Door	79
Henry Roadstar	24	935	Roadster	80
Henry Roadstar	24	1,050	Touring	80
Herreshoff	20-A	1,500	Tourabout	81
Imperial	35-36	1,650	Det. Ton.	85
Jons	Road.	1,000	Surrey	93

FOUR-PASSENGER CARS

NAME	CHASSIS MODEL	PRICE	REMARKS	Table No.
Jonz	Road.	$1,100	Toy Ton.	93
Kenmore	C	675	Surrey	95
Klinekar	4-30	1,675	Toy Ton.	97
Klinekar	4-40	2,250	"	98
Klinekar	6-50	2,700	"	99
Komet	R	2,000	Suburban	102
Komet	R	2,250	Quad.	102
Krit	.....	850	Surrey	103
Leader	R-35	1,625	Touring	104
Lexington	D	1,775	Torpedo	106
Lion	.....	1,650	.....	108
McFarlan	6	2,100	Torpedo	111
McFarlan	6	2,650	"	112
Marathon	M	1,700	"	113
Maytag	2-Cyl.	1,150	Demi. Ton.	115
Maytag	30	1,650	"	116
Maytag	35	2,000	"	117
Michigan	C	2 600	Toy Ton	119
Michigan	C	3,000	Torpedo	119
Midland	L	2,000	Toy Ton.	121
Midland	L	2,100	Fore Door	121
Morse	D	4,000	Torpedo	122
Norwalk	35	1,700	"	125
Norwalk	45	2,000	"	126
Only Car	A & F	1,050	"	127
Otto	Standard	2,000	Demi Ton.	128
Otto	Standard	2,150	Torpedo	128
Owen	1911	4,000	Close Coup.	130
Paige-Detroit	C	....	Surrey	132
Parry	27	1,000	Roadster	133
Parry	37-48	1,500	Toy Ton.	134
Parry	37-48	1,500	Roadster	134
Paterson	30	1,295	Demi Ton.	137
Paterson	30	1,175	Tourabout	137
Paterson	30	1,425	Fore Door.	137
Penn	30	1,075	Pony Ton.	138
Pennsylvania	C	3,000	Toy Ton.	140
Pennsylvania	F	4,500	"	141
Petrel	25-35	1,000	Torpedo	143
Petrel	45-55	1,500	Toy Ton.	145
Petrel	65-75	1,600	"	146
Pickard	E-F-G-H	825	.....	147
Pickard	E-F-G-H	850	.....	148
Pilot	B	1,850	Roadster.	149
Pilot	D	1,500	"	150
Primo	F P-11	1,750	Toy Ton.	151
Rayfield	A	1,700	"	158
Roader	30	850	Roadster	161
Rogers	B	700	Surrey	162
Schlosser	24-30	....	Toy Ton.	164
Spoerer	D-A	2,000	"	166
Spoerer	C	3,000	"	167
Standard	L-N	3,000	Roadster	168
Staver-Chicago	35	1,650	Fore Door	170
Velie	G	1,800	Toy Ton.	177
Velie	G	2,000	Fore Door	177
Victor	40	1,700	Surrey	178
Warren-Detroit	11	1,300	Demi.-Ton.	180
Warren-Detroit	11	1,500	Torpedo	181
Washington	C-40	2,250	Toy Ton.	182
Welch-Detroit	S	3,000	Close Coup	183
W. F. S.	A	2,300	Gunboat	186
Wilcox	35	1,500	Demi. Ton.	188
Zimmerman	L	775	Surrey	190
Zimmerman	Z-40	1,700	Torpedo	191

From Which the 1911 Buyer May Select

this means that there is one body style for every 150 possible buyers, computing the output for 1911 at 150,000 cars, which is a very conservative estimate.

In both the independent and A. L. A. M. groups, the five-passenger car leads in popularity and numbers; next comes the four-passenger; then the two-passenger; next the seven-passenger; then the three-passenger, followed by the limousine, landaulet and coupe.

The following is a comparative tabulation of the different body types, with their standing in each of the divisions:

Division—	Independents	A.L.A.M.
Five-passenger	155	149
Four-passenger	116	103
Two-passenger	111	71
Seven-passenger	48	67
Three-passenger	36	28
Limousine	26	64
Coupe	13	17
Landaulet	7	44
Six-passenger	3	4
Motor Buggy	6	0
Totals	521	542

TWO-PASSENGER CARS

NAME	CHASSIS MODEL	PRICE	REMARKS	Table No.
Alpena	A	$1,450	Torpedo	4
Ar Bens	30-40	....	Roadster	5
Badger	C	1,250	"	13
Belden	A	6,000	"	15
Belden	B	4,500	"	16
Bergdoll	Roadster	1,600	Runabout	18
Berkshire	E	2,800	"	19
Black-Crow	10, 11, 12	1,000	Roadster	20
Cameron	15	850	Flyer	24
Cameron	.....	885	"	26
Cameron	.....	800	Runabout	26
Cameron	(6 Cyl.)	....	"	28
Cameron	(6 Cyl.)	....	Flyer	29
Carhartt	B. C. D. E.	2,250	Roadster	30
Carhartt	J	1,100	"	31
Cavalier	C	1,250	"	32
Cino	.....	2,250	Semi. Race	33
Clark	A & B	....	Torpedo	34
Colby	H	1,750	Roadster	36
Cole	30	1,600	"	37
Cole	Flyer	1,500	"	38
Correja	35	1,450	Gunboat	40
Crawford	30	....	Roadster	42
Cunningham	H	3,250	"	44
Cutting	A-30	1,100	Torpedo	45
Cutting	B-40	1,350	"	46
Cutting	50	1,650	"	47
De Tamble	G-H-J	1,000	Roadster	50
Diamond-T	.....	3,300	"	53
Empire	C	950	"	54
Falcar	N	1,850	Speedcar	56
Firestone-Col'mbs	74-C	....	Torpedo	57
Ford	T	725	Torpedo	60
Ford	T	680	Runabout	60
Fuller	A	1,650	Roader	62
Gaylord	S	1,250	Roadster	66
G. J. G	.....	2,500	Runabou	
Great Southern	50-R	3,250	Roadster	70
Halladay	G	1,125	"	74
Halladay	40	1,700	"	76
Havers	6	1,650	Torpedo	78
Henry	40	1,750	Roadster	79
Henry	40	1,800	Enclosed	79
Henry Roadster	24	900	Roadster	80
Imperial	42-3-4	1,500	"	85
Jenkins	1911	2,750	Runabout	88
Jonz	Runabout	750	"	92
Kenmore	A	500	"	94
Kenmore	C	600	"	95
Klinekar	4-24	1,500	"	96
Klinekar	4-30	1,625	"	97
Klinekar	4-40	2,225	"	98
Klinekar	6-50	2,650	"	99
Klinekar	6-60	2,950	"	100
Komet	R	1,850	Speedster	102
Komet	R	2,000	Express.	102
Krit	.....	800	Runabout	103
Leader	R-35	1,525	Roadster	104
Lexington	D	1,600	Torpedo	106
Lion	.....	1,650	Roadster	108
McFarlan	6	2,000	Runabout	111
McFarlan	6	2,500	"	112
Marathon	M	1,500	Torpedo	114
Maytag	2-Cyl.	1,100	Roadster	115
Metz	1911	485	Runabout	118

TWO-PASSENGER CARS

NAME	CHASSIS MODEL	PRICE	REMARKS	Table No.
Michigan	C	$2,500	Roadster	119
Midland	L	1,950	"	121
Motorette	M	385	Runabout	123
Nance	11	1,900	"	124
Norwalk	35	1,600	Fore Door	125
Norwalk	45	2,000	Torpedo	126
Only Car	A & F	800	"	127
Owen	1911	4,000	Runabout	130
Paige-Detroit	B	800	Roadster	131
Parry	27	900	"	133
Parry	37-48	1,300	"	134
Paterson	30	1,200	"	137
Penn	30	975	"	138
Petrel	25-35	850	Torpedo	143
Petrel	40	1,350	Roadster	144
Pickard	E-F-G-H	750	.....	147
Pilot	B	1,850	Roadster	149
Pilot	D	1,500	"	150
Primo	F P-11	1,500	"	151
Primo	L R-11	1,250	"	152
Rambler	63	2,105	"	153
Rayfield	A	1,500	Runabout	158
Reading	40	1,250	Roadster	159
Roader	20	650	Runabout	160
Roader	30	750	"	161
Rogers	B	650	"	162
Schacht	A A	1,335	"	163
Sibley	A	1,000	Roadster	165
Spoerer	D-A	1,900	Runabout	166
Spoerer	C	2,850	"	167
Staver-Chicago	35	1,650	Torpedo.	170
Staver-Chicago	35	1,650	Racer	170
Van	22	850	Roadster	176
Velie	G	1,800	"	177
Victor	40	1,600	Runabout	178
Virginian	A-50	3,000	Roadster	179
Warren-Detroit	11	1,200	"	180
Washington	C-40	2,250	"	182
Westcott	1911	2,000	"	185
W. F. S	A	2,150	"	186
Whiting	A	750	Runabout	187
Whiting	A	775	Torpedo	187
Wilcox	35	1,500	Roadster	188
Zimmerman	E	675	Runabout	189
Zimmerman	Z-40	1,500	Torpedo	191

THREE-PASSENGER CARS

NAME	CHASSIS MODEL	PRICE	REMARKS	Table No.
Abbott-Detroit	B	$1,500	Fore Door	1
Adams	C	1,800	Roadster	2
Auburn	Y	1,700	"	7
Austin	45	3,000	Det. Fore D	8
Austin	50	3,750	"	9
Austin	60	5,750	"	10
Bergdoll	Roadster	1,500	Roadster	18
Berkshire	E	2,800	Runabout	19
Cameron	.....	850	Roadster	27
Cino	.....	2,250	Runabout	33
Crawford	30	....	Roadster	42
Cunningham	H	3,250	"	44
Dearborn	H	....	"	49
Diamond-T	.....	3,300	"	53
Enger	40	1,775	Torpedo	55
Falcar	N	1,850	Roadster	56
Ford	T	680	"	60
Frontenac	C	3,500	"	61
Fuller	A Spec.	2,000	"	63
Great Western	40	1,600	Runabout	71
Halladay	G	1,100	Roadster	74
Halladay	J	1,500	"	75
Henry Roadster	24	930	"	80
Herreshoff	20-A	1,500	Runabout	81
Herreshoff	25	950	"	83
Kenmore	C	625	Roadster	95
Krit	.....	825	"	103
Marathon	M	1,500	"	114
Otto	Standard	1,950	"	128
Pickard	E-F-G-H.	800	.....	147
Rogers	B	675	Roadster	162
Victor	40	1,650	Rumble	178
Warren-Detroit	11	1,200	Roadster	180
Washington	C-40	2,250	"	182
Wilcox	35	1,500	"	188
Zimmerman	L	760	Rumble	190

SIX-PASSENGER CARS

NAME	CHASSIS MODEL	PRICE	REMARKS	Table No.
Cutting	60	$2,350	Torpedo	48
Komet	R	2,500	Sextet	102
Owen	1911	4,000	Touring	130

BUGGY-TYPE CARS

Duryea	Buggyant	$600	Buggy	194
Duryea	"	700	Surrey	194
Duryea	"	700	Fold. Rear.	194
Independent	H	800	Surrey	195
Sears	G-K	370	Buggy	196
Sears	"	495	"	196

SEVEN-PASSENGER CARS

NAME	CHASSIS MODEL	PRICE	REMARKS	Table No.
Adams-Farwell	9	$3,500	Touring	3
Austin	45	3,250	Det. Fore D.	8
Austin	50	3,850	"	9
Austin	60	6,000	"	10
Belden	A	6,000	Touring	15
Belden	B	4,500	"	16
Berkshire	E	2,900	"	19
Black-Crow	17 & 20	2,000	"	23
Cunningham	H	3,500	"	44
Cutting	60	2,250	Fore Door	48
Derain	O-4	4,000	Touring	51
Diamond-T	.....	3,500	"	53
Firestone-Col'mbs	66-C	....	"	59
Frontenac	C	3,500	"	61
Gaeth	.....	3,500	Str. Line	64
G. J. G	.....	2,750	Touring	67
Great Southern	50	3,500	"	69
Grout	45	2,750	"	73
Grout	45	2,850	Fore Door	73
Halladay	50	2,650	Touring	77
Halladay	50	2,750	Fore Door	77
Jenkins	1911	2,850	Touring	88
Johnson	50	3,000	"	91
Johnson	50	3,100	Fore Door	91
Klinekar	6-60	3,250	Touring	100
Lexington	A	2,500	"	105
Lexington	A	2,500	Fore Door	105
Luverne	740	2,250	Touring	110
Luverne	740	2,500	Torpedo	110
McFarlan	6	2,500	Fore Door	112
Midland	K	2,250	Touring	120
Morse	D	4,000	"	122
Pennsylvania	B	3,500	"	139
Pennsylvania	H	4,700	"	142
Rambler	65	3,050	"	156
Schlosser	24-30	....	"	164
Spoerer	C	3,250	"	167
Staver-Chicago	40	1,850	"	172
Staver-Chicago	40	2,000	Fore Door	172
Stuyvesant	.....	3,000	Touring	174
Stuyvesant	.....	....	"	175
Virginian	A-50	3,000	"	179
Washington	C-40	2,250	"	182
Welch-Detroit	S	3,000	"	183
Welch-Detroit	S	3,100	Fore Door	183
Welch-Pontiac	4-R	....	Touring	184
Westcott	1911	2,250	Fore Door	185
Wilcox	35	1,500	Touring	188

LIMOUSINES

Austin	50	$5,000	7-Pass.	9
Austin	60	7,000	Det. Fore D	10
Babcock	F	....	Special	11
Belden	A	7,200	7-Pass.	15
Belden	B	5,700	"	16
Bergdoll	C	2,500	5-Pass.	17
Colburn	N	4,500	7-Pass.	35
Cunningham	H	4,500	5 or 7	44
Derain	O-4	5,250	6-Pass.	51
Diamond-T	.....	4,200	7-Pass.	53
Firestone-Col'mbs	66-C	....	"	59
Frontenac	C	4,500	"	61
Halladay	40	3,000	.....	76
Halladay	50	4,000	.....	77
Johnson	40	3,500	.....	90
Johnson	50	4,000	5-Pass.	91
Klinekar	6-50	3,950	4-Pass.	99
Klinekar	6-60	4,500	5-Pass.	100
Lexington	A	3,550	7-Pass.	105
Michigan	C	3,500	5-Pass.	119
Owen	1911	5,400	6-Pass.	130
Rambler	65	4,140	7-Pass.	157
Standard	L-N	4,000	"	168
Staver-Chicago	40	3,250	"	173
Welch-Detroit	S	4,200	"	183
W-F-S	A	3,200	.....	186

COUPES

Abbott-Detroit	B	....	.....	1
Colburn	N	$3,750	Town Car	35
Colby	H	2,250	4-Pass.	36
Cunningham	H	4,000	2 or 3	44
Derain	O-4	5,300	3-Pass.	51
Ford	T	1,050	2-Pass.	60
Krit	.....	1,275	"	103
Parry	57-48	1,850	3-Pass.	134
Rambler	63	2,615	2-Pass.	153
Staver-Chicago	40	2,500	4-Pass.	171
Warren-Detroit	11	1,750	2-Pass.	181
Whiting	A	1,050	"	187
Wilcox	35	1,800	4-Pass.	188

LANDAULETS

Bergdoll	C	$2,600	5-Pass.	17
Colburn	N	4,500	7-Pass.	35
Cunningham	H	4,500	5 or 7	44
Ford	T	1,200	6-Pass.	60
Rambler	64	3,630	7-Pass.	155
Schlosser	24-30	....	"	164
Welch-Detroit	S	4,200	"	183

Some Cars Not Exhibited In New York

Motor Age Presents Short Description of Improvements on Many Models Which Have Been Saved for the National Show—Refinements of the Product Which Have Been Made Within the Last 12 Months

THE Austin line for 1911 comprises a chassis model 69, with a five-passenger touring body and a 141-inch wheelbase or a seven-passenger touring car body with a 147-inch wheelbase; a model 50, with five-passenger or a seven-passenger touring car bodies, both 135-inch wheelbase, and models 45 comprising a five-passenger touring car body and 126-inch wheelbase, and a seven-passenger touring car having a wheelbase of 132 inches. Otherwise the cars are practically identical except that on the models 60, 37 by 5-inch quick detachable tires are fitted; 36 by 4½-inch tires are used on the models 50, and on the models 45, 36 by 4-inch tires are furnished by the company.

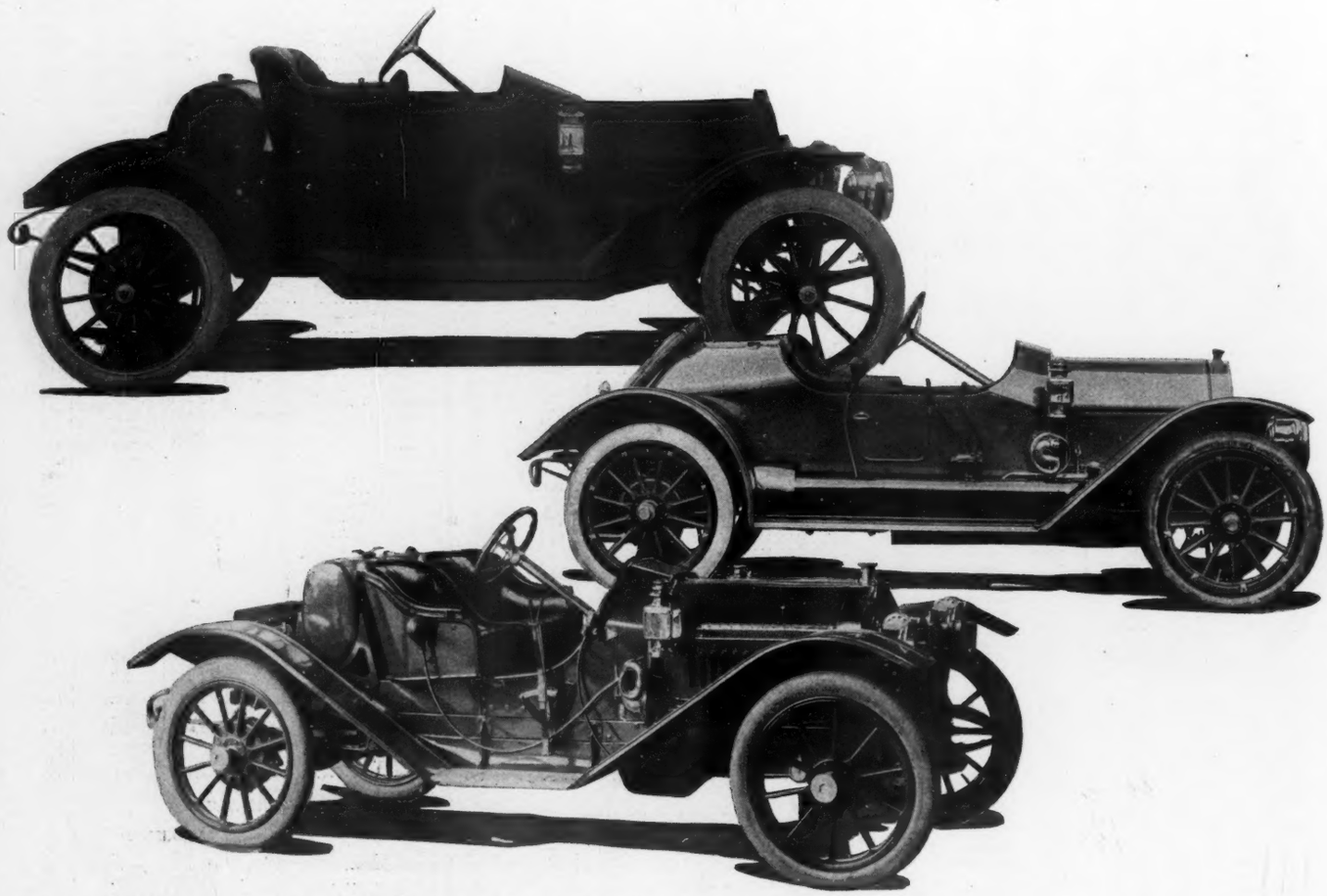
The mechanical features of the Austin car are a six-cylinder motor with the cylinders cast separately on models 60 and 50, and in pairs on the model 45. Two complete sets of ignition are used on this motor, and the carbureter is a multiple-jet design. Power from the motor to the floating rear axle is transmitted through a multiple-disk clutch, a selective sliding gearset and a propellor shaft. The front axle is a tubular construction. The frame is a pressed steel construction; an irreversible steering gear is employed, and the springs are semi-elliptic in front and scroll ellipties in the rear.

Badger Has Been Refined

The 1911 line of Badger cars contain no radical changes in type and design, the most noticeable difference being in refinement of lines, and in the addition of various mechanical features that a season's test and service have proven desirable. There are, however, three body types this year instead of two. Two of these, types B and D, are touring cars, and type C is a roadster design. The chassis of all are practically similar in design and construction, except that the type B touring car has a 110-inch wheelbase and the other two models have a wheelbase of 112 inches. The Badger chassis is a two-unit construction, the four-cylinder motor, together with a selective gearset, constituting one unit and the rear axle with the torsion tube enclosing the propellor shaft forming the second. With this construction there is but one universal joint, a Spicer, which is located at the rear of the gearset.

The motor is a four-cylinder, four-cycle L type, with a bore and stroke of 4 inches and the cylinders cast in pairs, and its official rating is 25.6 horsepower. The flywheel is enclosed and the gearbox is integral with the flywheel housing. As is common in many cars with this type of unit construction, a conventional four-point suspension is used, the plant being carried on a sub frame. The motor is water-cooled by means of a thermo-syphon system, including a vertical tube radiator. Ignition is by means of a Bosch dual type with the magneto mounted on a bracket on the right side of the crankcase and driven from enclosed gears.

The rear axle of the Badger chassis is a



ROADSTERS AT CHICAGO SHOW—REO, TOP; COLUMBIA, CENTER; CINO, BOTTOM

But Which Are On View at Chicago

Changes Made in the Austin, Badger, Black Crow, Colby, Cino, Dorris, Diamond T, Enger, Falcar, Glide, Great Western, Halladay, Kenmore, Klinekar, Rambler, Reading, Staver-Chicago, Westcott and Zimmerman

semi-floating design equipped with Hyatt roller and New Departure ball bearings, and the front axle is an I-beam drop forging. A pressed channel steel frame is used which is mounted on three-quarter elliptic rear and semi-elliptic front springs, and the steering gear is of the worm and gear design with the tire-rod back of the front axle.

Black Crow in Three Styles

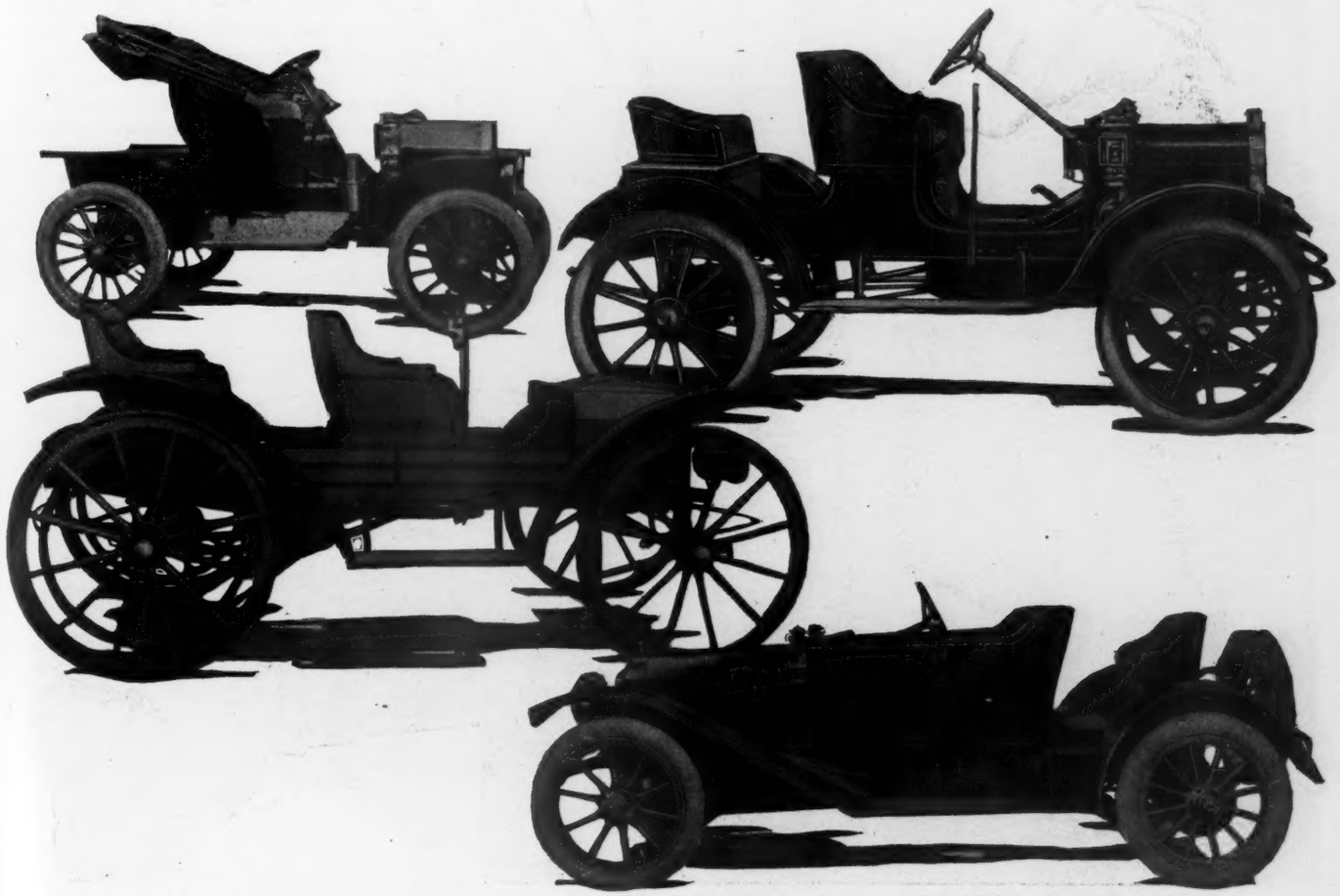
The Black Crow motor cars are built with three chassis types, in which three distinct motors are employed. The first chassis type employs a four-cylinder motor with a monobloc casting. It is an Atlas design with 4-inch bore, 4½-inch stroke, and having the valves located on the right side. The majority of the readers are familiar with this motor, it having been used in the Hudson and Courier cars last season. It has a self-contained lubricating system, thermo-syphon cooling and magneto ignition supplemented by battery. In all there are five different body types mounted on this chassis, these being two roadsters, surrey, and two touring cars. The wheelbases range from 107 to 110 inches. These chassis use a selective gearset and semi-floating rear axle on the new models for this year.

The second distinctive Black Crow chassis employs a Milwaukee four-cylinder motor with 4⅜-inch bore and 4½-inch stroke. This motor has its cylinders cast in parts with valves on the left side. The motor uses an enclosed oiling system, thermo-syphon cooling and magneto ignition. The chassis is built with a three-speed gearset and a Covert semi-floating rear axle formed with a one-piece pressed-steel housing. This model carries a fore-door, five-passenger touring-car body, and has the emergency and change-speed levers inside.

The third Black Crow chassis type carries five-passenger and seven-passenger bodies and uses a Sommers four-cylinder motor, 4⅜-inch bore and 5-inch stroke. Like the Milwaukee, this motor has the cylinders cast in pairs with valves on one side. It also resembles the other types in the use of self-contained lubrication and thermo-syphon cooling. The Remy magneto is standard, with an option on Splitdorf if desired. On this chassis the regular three-speed selective gearset is employed and a full-floating rear axle used. Both the five and seven-passenger cars are made with 120-inch wheelbase, which is the only wheelbase length used in this chassis of the Black Crow line.

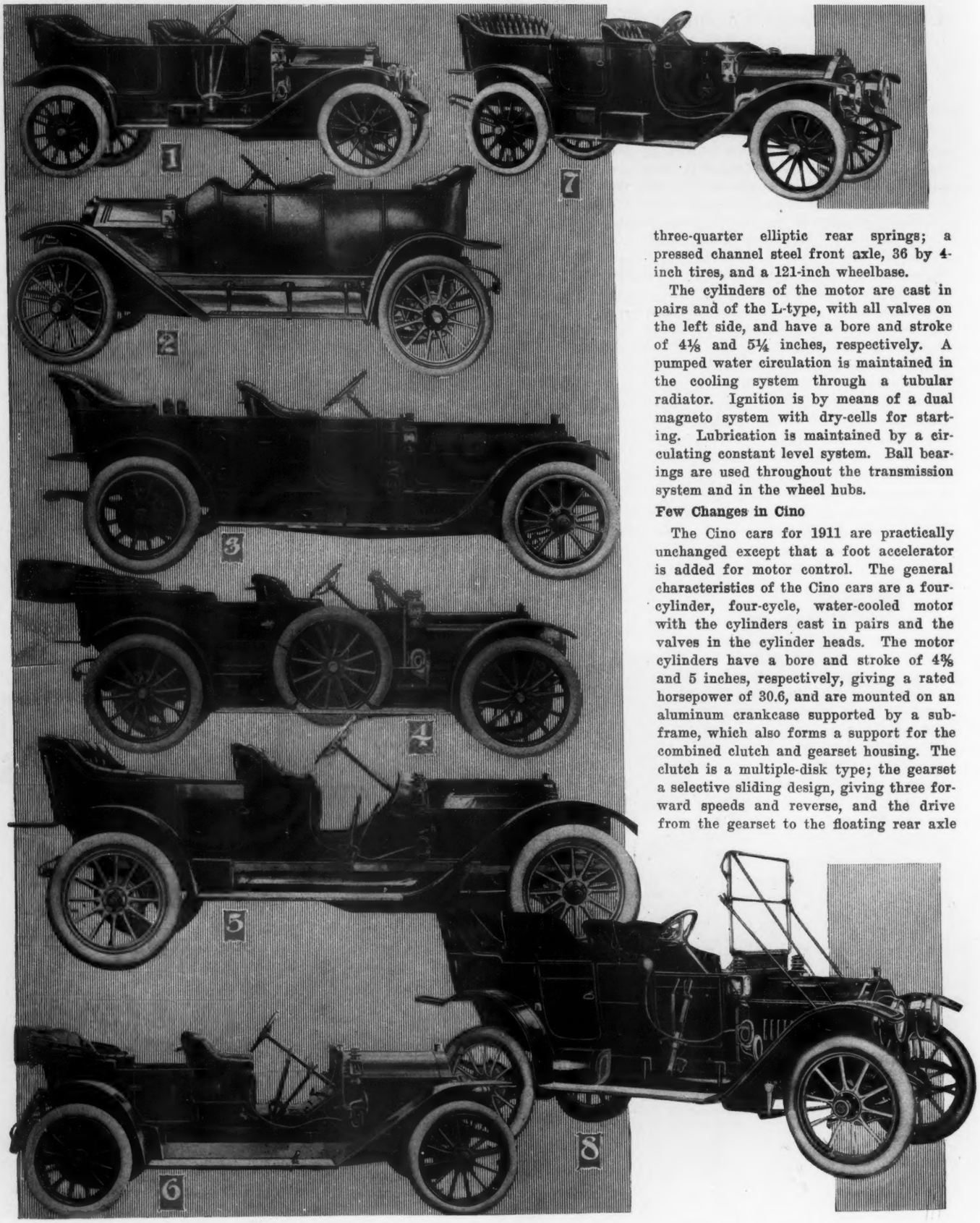
Two in the Colby Line

A five-passenger touring car and an attractive looking men's roadster comprise the line of Colby cars which recently entered the motor car field. Both body types are mounted on a single chassis design, the characteristic features of which are a four-cylinder, four-cycle, water-cooled motor; a multiple-disk clutch, a selective-sliding gearset located amidships and giving three forward speeds and reverse; a propellor shaft enclosed in a torsion tube, a floating rear axle, pressed-steel frame of channel section mounted on semi-elliptic front and



ZIMMERMAN, UPPER LEFTHAND CORNER; KENMORE, UPPER RIGHT; I. H. C., LOWER LEFT; FALCAR, LOWER RIGHT

Eight Models Mostly of the New Fore-Door Type



three-quarter elliptic rear springs; a pressed channel steel front axle, 36 by 4-inch tires, and a 121-inch wheelbase.

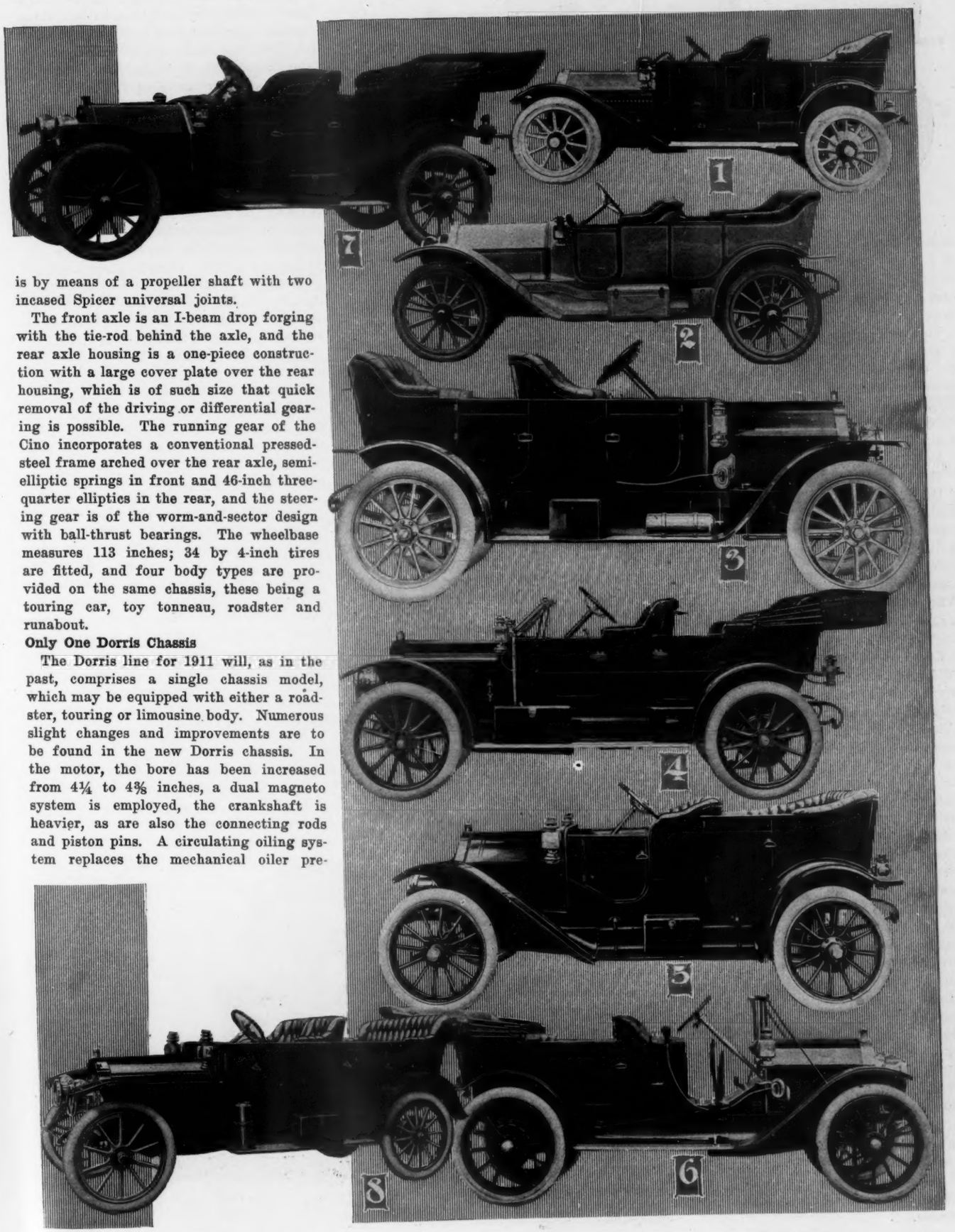
The cylinders of the motor are cast in pairs and of the L-type, with all valves on the left side, and have a bore and stroke of 4⅛ and 5¼ inches, respectively. A pumped water circulation is maintained in the cooling system through a tubular radiator. Ignition is by means of a dual magneto system with dry-cells for starting. Lubrication is maintained by a circulating constant level system. Ball bearings are used throughout the transmission system and in the wheel hubs.

Few Changes in Cino

The Cino cars for 1911 are practically unchanged except that a foot accelerator is added for motor control. The general characteristics of the Cino cars are a four-cylinder, four-cycle, water-cooled motor with the cylinders cast in pairs and the valves in the cylinder heads. The motor cylinders have a bore and stroke of 4⅝ and 5 inches, respectively, giving a rated horsepower of 30.6, and are mounted on an aluminum crankcase supported by a subframe, which also forms a support for the combined clutch and gearset housing. The clutch is a multiple-disk type; the gearset a selective sliding design, giving three forward speeds and reverse, and the drive from the gearset to the floating rear axle

1, Zimmerman; 2, Great Western; 3, Pope-Hartford; 4, Rambler; 5, Schacht; 6, Simplex; 7, Enger; 8, Cino

Fresh Ideas In Body Styles Brought Out for This Year



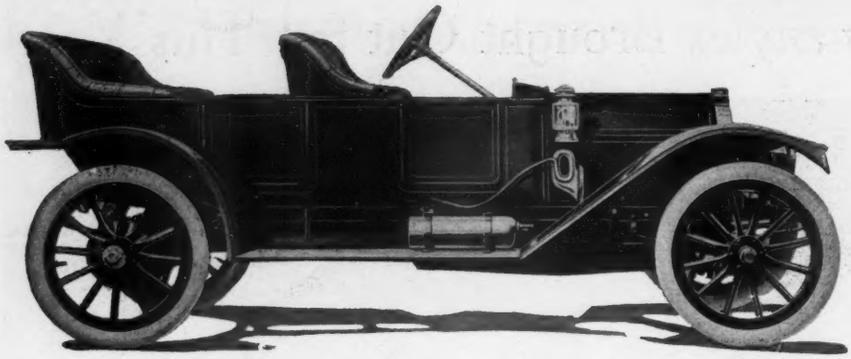
is by means of a propeller shaft with two incased Spicer universal joints.

The front axle is an I-beam drop forging with the tie-rod behind the axle, and the rear axle housing is a one-piece construction with a large cover plate over the rear housing, which is of such size that quick removal of the driving or differential gearing is possible. The running gear of the Cino incorporates a conventional pressed-steel frame arched over the rear axle, semi-elliptic springs in front and 46-inch three-quarter elliptics in the rear, and the steering gear is of the worm-and-sector design with ball-thrust bearings. The wheelbase measures 113 inches; 34 by 4-inch tires are fitted, and four body types are provided on the same chassis, these being a touring car, toy tonneau, roadster and runabout.

Only One Dorris Chassis

The Dorris line for 1911 will, as in the past, comprises a single chassis model, which may be equipped with either a roadster, touring or limousine body. Numerous slight changes and improvements are to be found in the new Dorris chassis. In the motor, the bore has been increased from 4¼ to 4⅜ inches, a dual magneto system is employed, the crankshaft is heavier, as are also the connecting rods and piston pins. A circulating oiling system replaces the mechanical oiler pre-

1, GLIDE; 2, HALLADAY; 3, BLACK CROW; 4, RAMBLER; 5, GREAT WESTERN; 6, DORRIS; 7, KLINEKAR; 8, FALCAR



TOURING CAR MODEL OF STAVER-CHICAGO

viously used; the breather pipe is changed to form a filler as well; and a float indicator is conveniently placed on the crankcase of the motor to show the oil level therein.

The upper portion of the crankcase is a one-piece barrel type construction, with the oil reservoir forming the detachable lower portion. The bearing surfaces of the crankshaft have been increased 40 per cent; the valves are $\frac{1}{8}$ inch larger. A change is found in the intake pipe design in that it now curves around the outside of the exhaust pipe, giving a better flow of the gases therein and increasing accessibility. The radiator this year is a trifle larger and of a vertical flat tube design; and a bronze centrifugal water pump is employed.

Chassis Frame Heavier

The chassis frame this year is of heavier construction; it is narrowed in front and raised over the rear axle; and bumpers are fitted to the rear axles. The clutch is now larger and of improved design; the gearcase has four supporting legs instead of three; the gearset shafts are mounted on Timken roller bearings instead of plain bronze ones; the transmission brake has been enlarged ¼ inch, so that its dimensions are now 2½ by 7¾ inches; the torsion tube is reinforced by using concentric double tubing for 9 inches up from the back end; and the front end of the torsion rod support is of improved design.

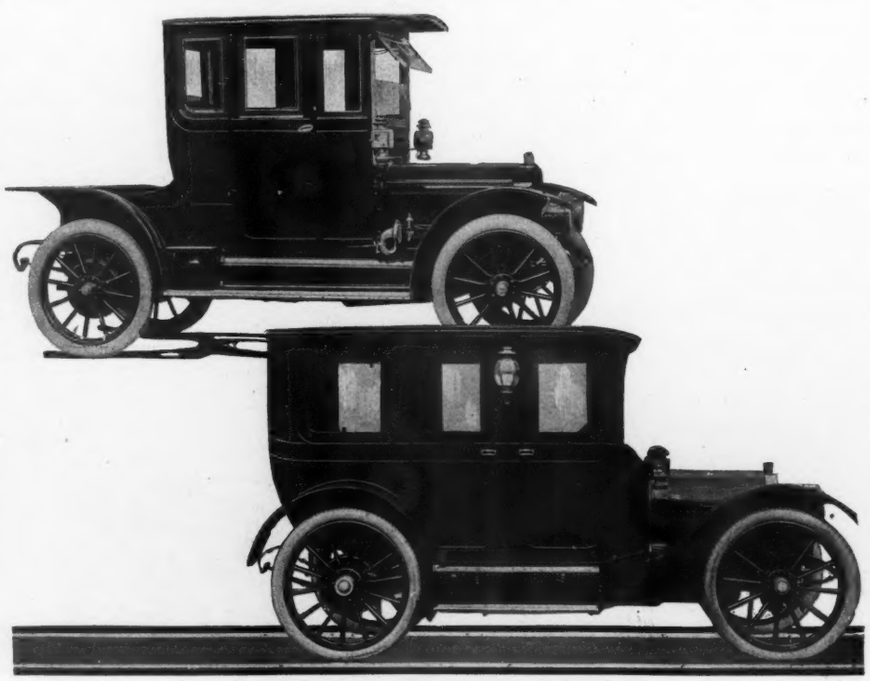
Tires 36 by 4 inches are now employed instead of the 34-inch ones; brakes are enlarged from 12 to 14 inches in diameter, have a 2¼-inch face, and are adjustable without removing the wheels. Springs are flatter and the front shackles of the rear springs are simplified and combined with the brake rod; bronze spring saddles are employed on the rear axle which will neither rust nor bind; larger wheel spokes and felloes are employed, increasing their rigidity, and quick detachable demountable rims are used. Grease cups are fitted to all rear axle bearings, also to moving parts of the brakes and spring saddles; and all spring shackles have spring covered oil cups. Aluminum foot and floor board supports are now a part of each chassis, so that bodies are readily interchangeable.

For the 1911 season an entirely new Diamond T model is brought out and the manufacture of the 1910 models discontinued. The new Diamond T chassis has a Continental motor made to Diamond T specifications. It is a four-cylinder four-cycle water-cooled design, with L-type cylinders cast in pairs having a bore and stroke of 5 and 5½ inches respectively. A multiple-disk clutch running in oil transmits the power from this motor to a selective sliding gearset, giving three forward speeds and reverse, and the gearset is mounted on a subframe with the motor. A propeller shaft with two metal encased universal joints and a floating rear axle complete the features in the transmission mechanism. An I-beam front axle is used; wheels are equipped with 36 by 4½ inch tires; and the wheelbase is 126 inches. The chassis frame is a heavy pressed steel structure, 5½ inches deep in the center, with exceptionally wide flanges, and it is mounted on semi-elliptic front springs and three-quarter scroll elliptic rear ones.

Among the many interesting details of this year's construction one finds 2½-inch valves, spiral valve-springs, and all valve-operating mechanisms thoroughly inclosed and lubricated. The engine gears are of spiral design and provided with a thrust spring to prevent back lash; provisions are made at the front end of the motor for the attachment of a gear-driven lighting dynamo. Lubrication of the motor is by means of a circulating splash system, in which the circulation is maintained by two plunger pumps driven by eccentrics off the camshaft. Ignition is by means of a high-tension dual magneto system, with the combined unit coil and switch passing through the dash and provided with an integral lock. A vertical tube radiator of cellular appearance with one side on a flexible trunnion, a centrifugal gear-driven water pump and an adjustable belt-driven fan are features of the cooling system. Annular ball bearings are used in the gearset; wheels are mounted on Timken roller bearings; and grease cups are to be found on all outboard bearings. Brakes are of the internal and external type on the rear wheels; the steering links are above and behind the front axle and conventional right hand control is employed.

Few Changes in Enger

The Enger cars for 1911 show a number of slight changes and improvements. In the motor the bore and stroke of the cylinders have been increased from 4½ by 5 inches to 4¾ to 5¼ inches. The valves are larger; the fan has a ring around the blades to increase their rigidity; an improved carbureter is fitted; a vertical-tube type radiator of cellular appearance is a feature of the cooling system, and in the ignition system a high-tension magneto is employed. In the transmission system the clutch disks have been increased in di-



RAMBLER AT TOP; OWEN BERLINE AT BOTTOM

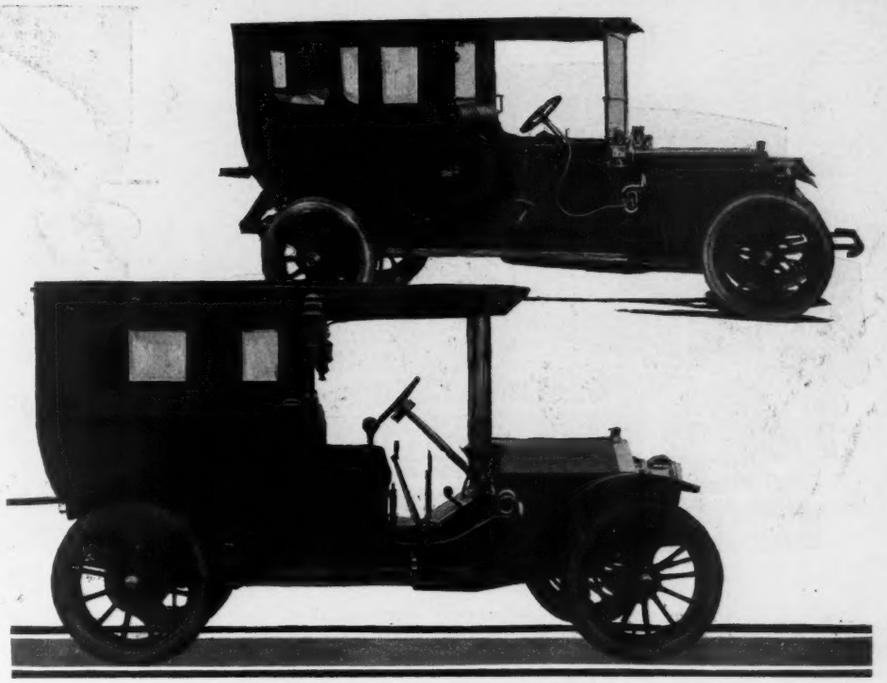
ameter, the universal joint between the clutch and gearset is inclosed in an aluminum case, and the gearcase is now supported on three legs instead of four, having only one point of support on the left side; the universal joint at the front end of the propeller shaft is also incased in a metal housing instead of a leather boot; the torsion tube inclosing the propeller shaft is heavier and larger in diameter; the rear axle is a trifle heavier and of a semi-floating type instead of floating, and annular bearings are used in the rear axle instead of adjustable ball bearings. Wheels 36 inches in diameter instead of 34 inches may be fitted, if desired, at an extra cost. The front axle steering knuckles are changed from the single ball bearing at the upper end of the vertical spindle to a radial ball bearing, and the springs are longer.

Subframe on Falcar

Among the changes and improvements to be found in the Falcar this year is the addition of a subframe for the support of the motor and gearset to relieve the crankcase of road strains. Wider faced timing gears are employed in the engine, and the springs and pushrods of the valves are inclosed to exclude dust and dirt, facilitate cleaning the motor, modify the noises of the valve-operating mechanisms and aid in their lubrication. The propeller shaft now has two inclosed universal points instead of being contained in a torsion tube with a single universal joint at the forward end; and a tubular cross-brake shaft is employed in the braking system with the equalizing effect obtained by the use of cables and equalizing levers. Radius rods communicating between the rear axle and the chassis frame are now used, and the torque bar is eliminated. The spring seats are anchored to the rear axle and form a support for the rear end of the radius rods, and better riding qualities are claimed to have been brought about by these changes. Another feature is the use of annular ball bearings throughout the rear axle.

Considerable attention has been given the body equipment of the Falcar this year. There is a five-passenger fore-door touring car of clean-cut appearance and straight-line design; a fore-door speedway type introduces some new lines as regards a racy appearing car, it having a deeply shrouded dash which effectively houses in the driver, staggard seats to increase the riding qualities at high speeds, and regular racing oil and gasoline tanks at the rear.

The line also includes a fore-door roadster, which can be used either as a two or three-passenger car with the rumble seat behind, and which also follows the present fore-door tendency, having a short shroud between the sides and from the dash back. The fourth model is a toy tonneau, which is not a fore-door type, but in which the seats are set low with a general rakish appearance.



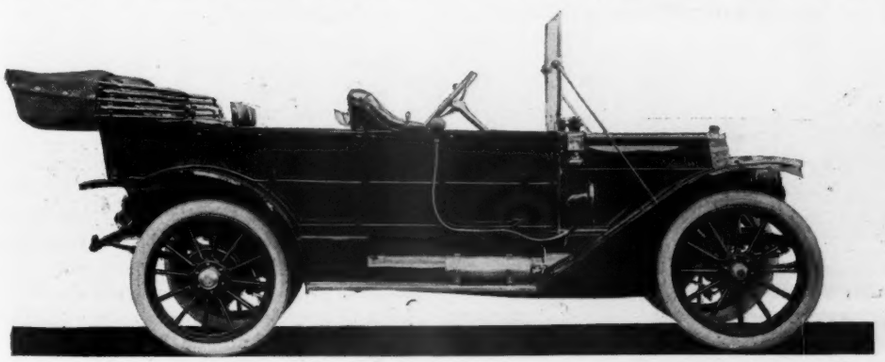
LOCOMOBILE AT TOP; DORRIS AT BOTTOM

Glide Practically Unchanged

Except for improvement in detail and special attention to new body types, including a torpedo design with the steering wheel on the left and control levers in the center of the car, the Glide cars manufactured by the Bartholomew Co. are continued practically unchanged for the 1911 season. For this year the company has announced five pleasure models all fitted with the same motor, which is an adaptation of the Rutenber design, but built specially by the Glide people.

This motor has a bore of 4¾ inches and a 5-inch stroke, which gives an A. L. A. M. rating of 36.1 horsepower. The five models are intended to cover practically every range of requirements and they include a seven-passenger touring car, five-passenger touring car, four-passenger torpedo, four-passenger Scout, which is a toy tonneau design, and a four-passenger roadster, and to these might be added the Glide delivery wagon body.

The general chassis details are alike on all of these models; all of them have 120-inch wheelbase except the Scout and roadsters, which measure 122 inches. All of them are fitted with 36-inch wheels except the Scout, which takes a 40-inch size. There is also a slight difference in the spring suspension. A double set of semi-elliptics is used on the seven-passenger car, whilst all the other models use three-quarter elliptic rear springs. Transmission of power from the motor to the rear wheels is by means of a multiple-disk clutch, a propeller shaft inclosed in a torsion tube, a three-forward speed selective sliding gearset bolted to the rear axle, and a semi-floating rear axle; the propeller and driving shafts are mounted in Timken bearings with ball bearings for thrust loads.

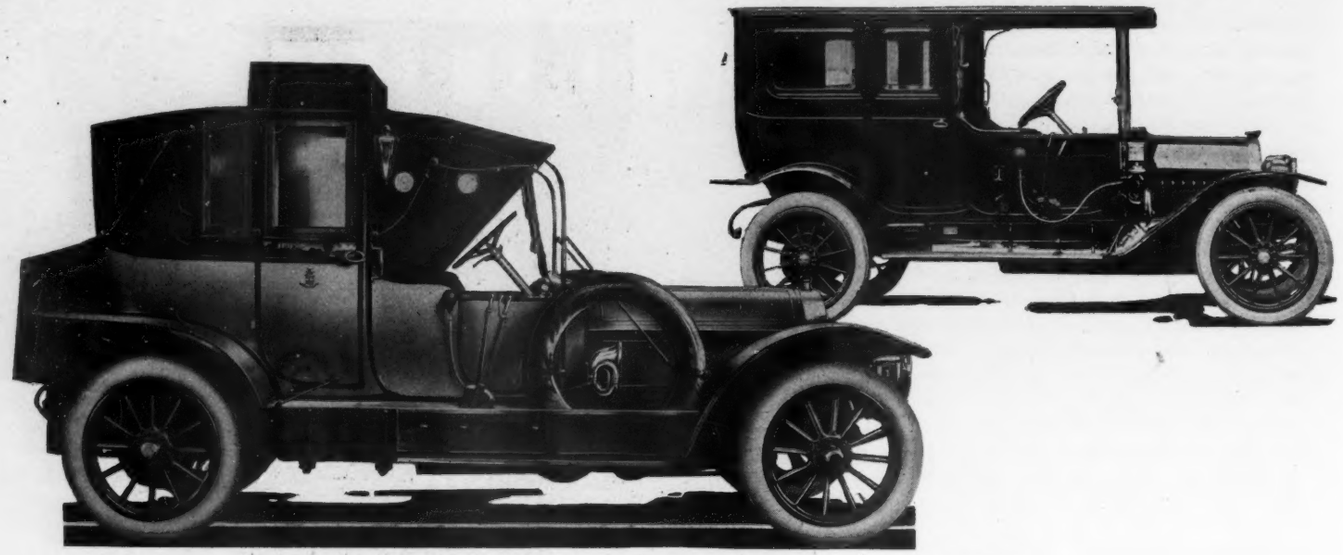


TOURING CAR MODEL OF THE WESTCOTT

Great Western's New Body Styles

Instead of manufacturing but one model as during the season of 1910, for 1911 the Great Western Automobile Co. is listing four body styles, all of which are mounted on a chassis with a 114-inch wheelbase, this being 2 inches longer than that of 1910. The four models listed are: A five-passenger touring car, a torpedo with a heavily hooded dash, a semi-torpedo with a straight dash and fore-doors, and a combination toy-tonneau and roadster, in which the tonneau may be removed and a single rumble seat attached.

On the torpedo all door fastenings are



PIERCE-ARROW GEORGE WASHINGTON COACH, WITH PREMIER LIMOUSINE IN CORNER

inside and the change-speed and emergency brake levers also are inside. This model is built for four passengers. The semi-torpedo is a four-passenger car with fore doors, but it has the control levers on the outside at the right of the driver's seat.

The characteristic mechanical features remain practically unchanged. They comprise a four-cylinder water-cooled four-cycle motor with the cylinders cast separately and having the inlet valves on the right side and operated as in an L-type motor and with the exhaust valves in the center of the heads and operated by means of rocker arms and pushrods. The motor is carried on a subframe and power is transmitted through a leather-faced cone clutch and incased universal joint to a selective sliding gearset, which is also mounted on the same subframe. Power from the gearset is transmitted through a propeller shaft, which is inclosed in a torsion tube, to a semi-floating rear axle. A pressed-steel channel frame is used mounted on semi-elliptic front springs and three-quarter-scroll elliptic rear ones; the front axle is an I-beam drop forging, and the control of the car is conventional.

Two New Halladay Models

In the Halladay line for 1911 there are two entirely new models known as 40 and 50. Models 28 and 40 of 1910 are discontinued, while model 30 of 1910 is carried along in 1911, unchanged except for slight improvements in the oiling system. The new model 40 for 1911, however, resembles the same model of 1910 except that the position of the oil sight on the motor is changed in that a float indicator is now placed conveniently above the crankcase on the right side.

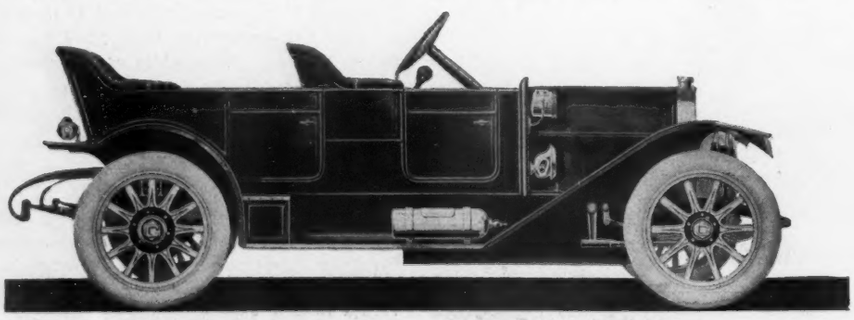
In the cooling system a honeycomb radiator replaces the tubular one; the pump flange has but three accessible bolts so that it may be removed in a few minutes without disturbing the radiator; the fan shaft bracket is reinforced, and the fan strengthened by means of ring attached to the ends of the fan blades. Valve pushrods now have their adjusting nuts provided with lock washers. The exhaust pipe tapers and increases in diameter toward the rear to reduce back pressure. The efficiency of the clutch is increased by adding to the number of disks; its annular ball thurst bearing is inclosed and provided with a large grease cup; adjustable pedals are fitted; and the clutch-operating mechanism is improved and simplified by eliminating the bar and yoke design and replacing it with a diamond-shaped member surrounding the clutch collar, which is pivoted the left side of the subframe.

Double universal joints of the sliding block and pin type are now used between the clutch and gearset. In the gearset a rocking lever is employed instead of the sliding bar type with the H-quadrant; the shifting rod therefore is eliminated and gearset operation simplified. By better workmanship more silent operation is obtained on the intermediate speeds. The front end of the drive shaft is supported on a specially designed heavy cross member of the frame; an improved ball and socket type of universal joint is used instead of the sliding block and pin design, and it is inclosed in a cast-steel case with a leather boot, which is packed with grease. The exposed drive shaft with its two universal joints has been dropped for an inclosed design, with one universal joint at the forward end.

The rear axle now is a floating one, of A. O. Smith construction, with a heavy pressed steel housing and unit driving and differential gears. The brake-operating shafts are behind the axle, both shafts telescope into a housing, and their leverage is increased. The frame is a double-drop construction, with a 5-inch kick-up in the rear; three-quarter elliptic springs have replaced the triple-action semi-elliptics previously used. A double-channel front axle replaces the I-beam drop forging; wheels are equipped with 36 by 3½ inch instead of 36 by 4 inch tires; the wheelbase is 118½ inches, instead of 123 inches, and the weight has been reduced from 3,000 to 2,650 pounds.

The Kenmore a Combination Type

In addition to the low-priced runabout of the combination business and pleasure type heretofore manufactured by the Kenmore Mfg. Co. there is now a similar car with a water-cooled motor and a large up-to-date touring car with a four-cylinder water-cooled motor. Except for the motors, one of which is a two-cylinder opposed air-cooled, rated at from 12 to 14 horsepower, and the other a two-cylinder opposed water cooled on the thermo-syphon principle, the convertible runabouts are practically identical. They have a planetary gearset, giving two forward speeds, shaft drive to a semi-floating rear axle, a tubular front axle, semi-elliptic front springs, elliptic rear ones, a wheelbase of 87 inches;



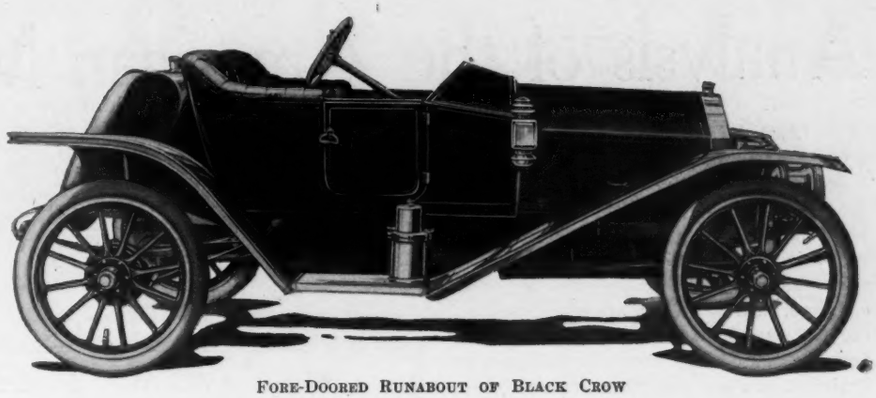
FORE-DOOR TOURING CAR MODEL OF THE COLBY

and 32-inch wheels, which may be equipped with either pneumatic, cushion or solid rubber tires. The features of the large car just brought out by this company comprise the four-cylinder motor above mentioned, which has cylinders having a 4-inch bore and 4½-inch stroke; a dry disk clutch, a propellor shaft enclosed in a torsion tube; a selective sliding gearset in unit with the rear axle, which gives three forward speeds and reverse; a semi-floating rear axle; 34 by 3½-inch wheels, and 114-inch wheelbase. The frame is a pressed channel steel design mounted on elliptic rear springs and semi-elliptic front ones and a five-passenger touring body is fitted, with a fore-door equipment if desired.

B. C. K. Co.'s Klinekars

Both commercial and pleasure vehicles comprise the B. C. K. Co.'s line of Klinekars for the season of 1911, and in the pleasure car contingent the number of chassis models has been increased from three to five, three of which have four-cylinder motors and the other two six-cylinder motors. In one of the six-cylinder models the cylinders are bolted en bloc, though separately cast, and there is a crankshaft bearing between each cylinder. The valves are on opposite sides of the cylinders and have nickel steel heads with carbon steel stems. Two separate systems of ignition are furnished, including a Bosch magneto and battery with a plain coil on the dash.

The motor is mounted on three-point suspension by two integral arms at the front end and resting on an I-beam cross-bar at the rear end. The motive power is transmitted through a leather-faced cone clutch to a sliding selective gearset, which gives three forward speeds and reverse. From the gearset, which is located amidships, a propellor shaft with two universal joints transfers the power to a floating rear axle. and ball bearings are employed throughout the transmission system. These features are practically identical with those of the 40-horsepower four-cylinder car, but in the smaller four-cylinder models the motor is an L-type design with the valves on the same side, and the rear axles are of a semi-floating design.



FORE-DOORED RUNABOUT OF BLACK CROW

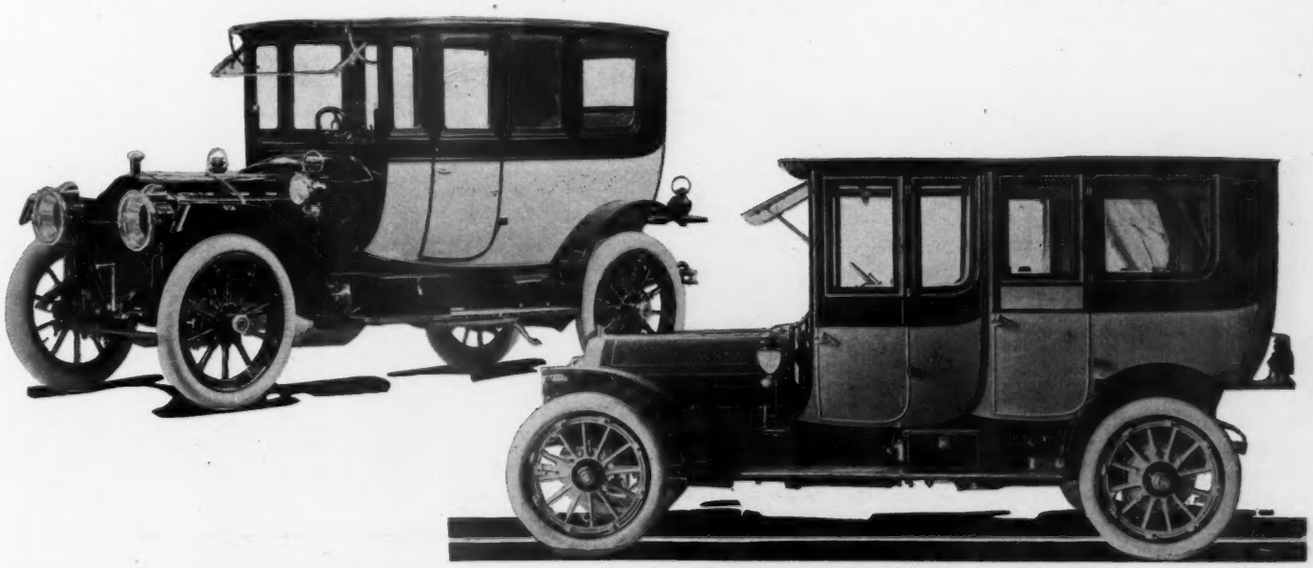
Some Changes in Ramblers

In the Rambler models for the coming season many slight changes or improvements are to be found which another year's experience has made practicable. On model 63 the carbureter is on the right side of the motor instead of the left, improvements are to be found in the intake manifold so that better distribution of the gases is obtained, and it is provided with priming and carbureter-adjusting facilities. In the ignition system the magneto is moved forward to a more accessible position; a dual system is employed using a single-unit coil on the dash instead of the four-unit master vibrator design; and a self-starting button is a feature of the coil. The mechanical oiler of the motor lubrication system has also been brought forward under the hood from under the floor board; there is an extra oil lead to the center crankshaft bearing. Two belts are now used to drive the oiler instead of one, so that positive operation is insured even though one belt should break.

In the cooling system the radiator design is slightly improved and the cover of the filling opening is of a patent design. The crankshaft is enlarged in diameter and the bearing surfaces increased 28 square inches; the flywheel is bolted to a flange integral with the crankshaft instead of keyed to the shaft; and the cams are now integral with the camshaft instead of secured with keys and pins. In the gearset the gears are $\frac{3}{8}$ inch wider. The brake-operating levers are improved so that greater leverage is obtained; the hand lever is operated by pulling it back instead of pushing it forward; and the brake drums are 2 inches greater in diameter and ½ inch wider faced, giving an increased friction surface of 97 square inches. Double radius rods instead of single ones are now employed which extend from the rear axle, parallel with and direct to the side members of the frame instead of being anchored to the cross member.

Springs are wider all around and have fewer leaves, and a seven-eighths scroll elliptic rear spring design is now used. The front axle and steering knuckles are heavier; the adjustable ball-bearings of the wheels are replaced by tapered roller ones; 4½ instead of 4-inch tires are employed; and shock absorbers on the rear axle are regular equipment. In the model 64 the same changes as on model 63 are to be found except that this car has a

(Continued to page 35.)



TWO FORE-DOOR TYPES OF LIMOUSINES, THE PACKARD AND THE STEVENS-DURYEA

Analysis of the American Motor Situation

MOTOR AGE presents on this and the following pages a comprehensive story of the motor situation as evidenced by a careful analysis of the manufacturers not belonging to the A. L. A. M., and for convenience the following pages have in view solely the motor products of these concerns, whether they are exhibiting at the Coliseum show or not. The motors referred to herein are those of makers who exhibited at the Grand Central palace, who will exhibit at the Coliseum, and in addition many who will not be exhibited at either shows, some of them having been only at Detroit, others at Philadelphia, and others will be seen only at the Boston show. The main object has been to bring them all together so that a definite comparison may be had.

Construction Is Discussed

On other pages the question of leading construction of motors is gone into very fully. As was done last year, the cars are divided into four great classes, namely, $1,000, $1,500, $2,500 and $4,000. This classification has been made for the convenience of the public. It does not mean much to say what is the average car of a certain year, when the prices range from $350 to $7,500. There is little real interest or value attached to the fact that if one car sells for $300, another for $7,800, then the average price of the two is $3,900. The $3,900 car cannot be compared in any sense with the $300 product. And it is to avoid such ridiculous results as this that the entire independent industry has been divided into four great divisions, as stated. Last year these same four divisions were used, and placing the four average cars of last year alongside of this year, as is done on some of the following pages, the reader is able to get a very clear and comprehensive knowledge of the situation.

Four-Cylinder a Leader

Before going into generalities it is interesting to note that, generally speaking, the four-cylinder car is a big leader in the independent field. There are a few sixes, but their number is very limited compared with the number of sixes built by A. L. A. M. manufacturers. In contrast with this is the fact that many independent makers are building cars with two cylinders, and there is also a good percentage using friction transmission of one form or another.

When it comes to analyzing the independent motor it is on the average a four-cylinder type with cylinders cast in pairs, and in which the L-type of cylinderhead is employed. There is a bigger following of the T-head cylinder in the A. L. A. M. ranks than in the independent ranks. Of the entire eight average cars, namely, the four average ones in the independent and the four average ones in the licensed, only one of the eight employs a T-head cylinder. The T-head permits of a symmetrical placing of the carbureter, magneto, water pump, etc., and allows of larger diameter valves, but it calls for two camshafts, which must be looked upon as an increased expense to the manufacturer. It also calls for a slightly greater intricacy in the cylinder casting.

One respect in which the independent maker is forging ahead of the A. L. A. M. manufacturer is in the combination of the motor and gearbox as a unit construction. It is astonishing in looking over the following pages to note the number of concerns employing this method of motor design. A fleeting glance shows such names as Dorris, Paterson, Badger, Alpena, Im-

FOUR AVERAGE INDEPENDENT CARS FOR 1911

In this table all of the cars of manufacturers who are not members of the Association of Licensed Automobile Manufacturers are divided into four classes, namely, $1,000, $1,500, $2,500 and $4,000. The cars in the $1,000 class, those selling from $1 to $1,250, are included. In the $1,500 class those selling from $1,251 to $2,250 are counted. The range of the $2,500 car is from $2,251 to $3,000. The $4,000 car includes all over $3,001. In each class the average of the wheelbases of all cars in the class is taken and is given here. In every other detail it is the average of all the cars in a class that is given (or used in finding the percentage) in each column of the table.

		$1,000 car	$1,500 car	$2,500 car	$4,000 car
Average Wheelbase	Inches	99	115	119	125
Front wheel	Inches	31.2x3.1	32.5x3.7	35x4.1	35.3x4.25
Rear wheel	Inches	31.2x3.1	32.5x3.7	35x4.2	35.8x4.5
Price of car		$870	$1,685	$2,490	$3,920
MOTOR					
Number of cylinders					
One	Percentage	2.5	..	..	..
Two	Percentage	33	..	..	..
Three	Percentage	2.5	..	..	..
Four	Percentage	62	95	82	65
Five	Percentage	..	..	..	4
Six	Percentage	..	5	18	31
Average bore	Inches	4.06	4.18	4.31	4.85
Average stroke	Inches	4.17	4.63	5.05	5.50
Average A. L. A. M.	Horsepower	19.86	30.45	37.40	43.33
Average piston displacement	Cubic inches	176.2	262.5	321.5	466
T type	Percentage	16	9	28	19
L type	Percentage	58	81	65	47
Valve-in-head	Percentage	18	10	7	31
Two-cycle	Percentage	8	..	..	3
Cylinders cast separately	Percentage	49	22	38	24
Cylinders cast in pairs	Percentage	19	60	62	76
Cylinders cast en bloc	Percentage	32	17	..	..
Cylinders cast in threes	Percentage	..	..	..	..
Air-cooled	Percentage	29	..	..	3
Water-cooled	Percentage	71	100	100	97
Thermo-syphon	Percentage	72	75	3	10
Pump Circulating	Percentage	28	25	97	90
Tubular radiator	Percentage	87	71	57	47
Cellular radiator	Percentage	13	29	43	53
IGNITION					
High-tension single	Percentage	51	16	7	3
High-tension dual	Percentage	31	62	56	55
High-tension double	Percentage	18	22	37	39
Make-and-break	Percentage	..	..	..	3
Low-tension single	Percentage	..	..	..	..
CARBURETER					
Gravity Feed	Percentage	98	95	70	65
Pressure Feed	Percentage	2	5	30	35
LUBRICATION					
Oil feed with fuel	Percentage	2	..	..	..
Circulating pump	Percentage	60	95	82	65
Gravity pump	Percentage	..	..	..	..
Mechanical oiler	Percentage	33	2	15	28
Circulating flywheel	Percentage	5	3	3	7
CLUTCH					
Multiple-disk	Percentage	38	45	45	52
Cone	Percentage	49	50	45	23
Internal band	Percentage	..	1	10	9
External band	Percentage	..	..	..	..
Dry segments	Percentage	..	..	..	13
None	Percentage	13	4	..	3
GEARSET					
Selective	Percentage	62	97	100	100
Two forward speeds	Percentage	21	..	..	..
Three forward speeds	Percentage	79	99	93	77
Four forward speeds	Percentage	..	1	7	23
Progressive	Percentage	..	..	..	..
Two forward speeds	Percentage	..	..	..	..
Three forward speeds	Percentage	..	..	..	..
Four forward speeds	Percentage	..	..	..	..
Planetary	Percentage	17	..	..	..
Two forward speeds	Percentage	100	..	..	..
Three forward speeds	Percentage		..	..	..
Friction	Percentage	16	3	..	..
DRIVE					
Shaft	Percentage	77	95	100	97
Chain	Percentage	23	5	..	3

In the Independent and Licensed Fields

perial, Cole, Cunningham, McFarlan, and several types of motors built by the Model Gas Engine Co. These various illustrations show that the desire to enclose the flywheel is increasing. This is particularly the case where a three-point suspension is used for the entire outfit.

The use of the enclosed flywheel is seen in the Imperial, Cole, Bromwell, Badger, Alpena, Paterson, Cunningham, etc. Where the flywheel is enclosed the housing is extended to each side in order to form supports for the motor direct on the side members of the frame. The expansion enclosing the flywheel is generally formed by a rearward continuation of the upper and lower portions of the crankcase. There is invariably an opening in the top of this housing through which the markings on the flywheel for timing the cylinders can be seen.

Where the clutch is corporate part of the flywheel and the flywheel is enclosed, that portion of the housing embracing the clutch is a bell-shaped front end of the gearbox, and in it is a large opening through which the clutch can be lubricated or adjusted.

Gearbox Details

Where the gearbox is formed as a unit, along the lines already referred to, it is rare that any support is furnished for it other than through the fact that it bolts direct to the rear end of the crankcase, at which point the crankcase is supported at the rear. This arrangement gives a three-point suspension to the combined motor and gearbox.

There are, however, not a few concerns using the unit construction of the motor and gearbox who do not inclose the flywheel. One of the pioneers in this respect is the Dorris, in which there is a semi-cylindrical spider surrounding the lower half of the flywheel and extending to the frame side members, giving two points of motor support. To this spider the gearbox bolts, this being its only form of support.

In some of the motor types built by the Model Gas Engine Co. the connecting link between the gearbox and crankcase consists of two arms, which embrace the sides of the flywheel and bolt to the rear end of the crankcase. Between the arms is left plenty of room for the clutch lubrication, adjustment and removal.

Silencing Motor Noises

There is not that expected landslide towards overhead valves that was looked for among the independent ranks a year ago. This is perhaps due to the fact that a motor with an overhead valve is apt to sound noisier than one with an L or T cylinder. This is due to the fact that the motor is higher and the valve parts are close to the top of the hood. Being close to the top of the hood, the vibration is stronger and consequently more vibration is set up in the hood and the noise is increased. It cannot be always taken that a quiet motor has not vibration, because many devices are employed today by which the motor noise is simply muffled but not eliminated.

A good example of muffling the overhead valve noise is seen in the Cunningham, in which aluminum caps completely enclose the rocker arm parts. There is a greater advantage, however, to these covers other than that of merely muffling noise. They greatly facilitate the lubrication of the valve rocker arms and other parts and prevent injury to the valves from dirt and sand.

FOUR AVERAGE INDEPENDENT CARS FOR 1911

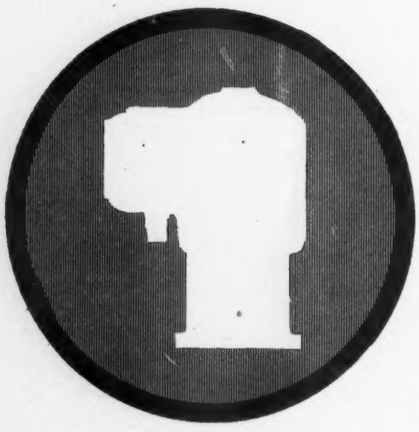
This table gives the bore and stroke in inches of the motors used by independent motor car manufacturers. The last column gives the ratio of the length of the stroke to the bore; that is, the inside diameter of the cylinders, and is found by dividing the stroke by the bore. The motor of the Only car, for instance, has a stroke nearly twice as great as the bore, the ratio being 1.95 to 1.

Car	Bore	Stroke	Ratio of Stroke to Bore
Only car	5⅛	10	1.95 to 1
Colburn	4¼	6	1.41 to 1
Austin	4½	6	1.33 to 1
Cutting	3¾	5	1.33 to 1
Paige-Detroit	3¾	5	1.33 to 1
Sibley	3¾	5	1.33 to 1
Stuyvesant	4½	6	1.33 to 1
Norwalk	4 5/32	5½	1.32 to 1
Adams	3⅞	5	1.29 to 1
Ar Benz	4⅛	5¼	1.27 to 1
Colby	4⅛	5¼	1.27 to 1
Falcar	4⅛	5¼	1.27 to 1
Henry	4⅛	5¼	1.27 to 1
Spoerer	4⅛	5¼	1.27 to 1
Washington	4⅛	5¼	1.27 to 1
W. F. S.	4⅛	5¼	1.27 to 1
Owen	4¾	6	1.26 to 1
Dearborn	4	5	1.25 to 1
Gaylord	4	5	1.25 to 1
McFarlan	4	5	1.25 to 1
Norwalk	4	5	1.25 to 1
Gaeth	4⅞	6	1.23 to 1
Klinekar	4¼	5¼	1.23 to 1
Krit	3¼	4	1.23 to 1
Stuyvesant	4⅞	6	1.23 to 1
Klinekar	4 3/32	5	1.22 to 1
Cunningham	4¾	5¾	1.21 to 1
Austin	4⅜	5¼	1.20 to 1
Belden	5	6	1.20 to 1
Henry	3¾	4½	1.20 to 1
Maytag	4¼	5⅛	1.20 to 1
Petrel	4⅜	5¼	1.20 to 1
Primo	3¾	4½	1.20 to 1
Reading	5	6	1.20 to 1
Berkshire	4 11/16	5½	1.17 to 1
Correja	4¼	5	1.17 to 1
Cutting	4¼	5	1.17 to 1
Great Smith	5⅛	6	1.17 to 1
Great Western	4¼	5	1.17 to 1
Koehler	4¼	5	1.17 to 1
Comet	4¼	5	1.17 to 1
Michigan	4¼	5	1.17 to 1
Schacht	4¼	5	1.17 to 1
Rayfield	3	3½	1.17 to 1
Velie	4½	5¼	1.17 to 1
Wilcox	4¼	5	1.17 to 1
Cutting	4¾	5½	1:16 to 1
Jenkins	4¾	5½	1.16 to 1
Johnson	4½	5¼	1.16 to 1
Black Crow	4⅛	4¾	1.15 to 1
Klinekar	4	4⅝	1.15 to 1
Midland	4¾	5½	1.15 to 1
Motorette	3¼	3¾	1.15 to 1
Black Crow	4⅜	5	1.14 to 1
Cino	4⅜	5	1.14 to 1
Empire	3½	4	1.14 to 1
Great Smith	5¼	6	1.14 to 1
Staver-Chicago	4⅜	5	1.14 to 1
Klinekar	3¾	4¼	1.13 to 1
Spoerer	4⅞	5½	1.13 to 1
Abbott-Detroit	4	4½	1.12 to 1
Alpena	4	4½	1.12 to 1
Bergdoll	4	4½	1.12 to 1
Black Crow	4	4½	1.12 to 1
Havers	3⅜	3¾	1.12 to 1
Herreshoff	3⅜	3¾	1.12 to 1
Maytag	4	4½	1.12 to 1
Penn	4	4½	1.12 to 1
Pilot	4¼	4¾	1.12 to 1
Primo	4	4½	1.12 to 1
Warren-Detroit	4	4½	1.12 to 1
Auburn	4½	5	1.11 to 1
Babcock	4½	5	1.11 to 1
Diamond	4½	5	1.11 to 1
Fires'ne-Columbus	4½	5	1.11 to 1
Fuller	4½	5	1.11 to 1
Grout	4½	5	1.11 to 1
Halladay	4½	5	1.11 to 1
Lexington	4½	5	1.11 to 1
Lion	4½	5	1.11 to 1
Luverne	4½	5	1.11 to 1
Midland	4½	5	1.11 to 1
Schlosser	4½	5	1.11 to 1
Standard	4½	5	1.11 to 1
Staver-Chicago	4½	5	1.11 to 1
Derain	5	5½	1.10 to 1
Imperial	4¾	5¼	1.10 to 1
Johnson	5	5½	1.10 to 1
McFarlan	3⅝	4	1.10 to 1
Pennsylvania	4¾	5¼	1.10 to 1
Pilot	4¾	5¼	1.10 to 1
Rambler	5	5½	1.10 to 1
Welch Pontiac	5½	6	1.09 to 1
Enger	4⅝	5	1.08 to 1
Morse	4⅝	5	1.08 to 1
Petrel	4⅜	4¾	1.08 to 1
Paige-Detroit	3¾	4	1.07 to 1
Parry	3½	3¾	1.07 to 1
Petrel	3¾	4	1.07 to 1
Van	3¾	4	1.07 to 1
Carhartt	4¼	4½	1.06 to 1
Cole	4¼	4½	1.06 to 1
Crawford	4¼	4½	1.06 to 1
DeTamble	4¼	4½	1.06 to 1
Fires'ne-Columbus	4¼	4½	1.06 to 1
Ford	4¼	4½	1.06 to 1
Imperial	4¼	4½	1.06 to 1
Johnson	4¼	4½	1.06 to 1
Leader	4¼	4½	1.06 to 1
Marathon	4¼	4½	1.06 to 1
Metz	3.3	3½	1.06 to 1
Otto	4¼	4½	1.06 to 1
Parry	4¼	4½	1.06 to 1
Paterson	4¼	4½	1.06 to 1
Roader	4	4¼	1.06 to 1
Fontenac	4¾	5	1.05 to 1
Fuller	4¾	5	1.05 to 1
G. J. G.	4¾	5	1.05 to 1
Grout	4¾	5	1.05 to 1
Halladay	4¾	5	1.05 to 1
Lexington	4¾	5	1.05 to 1
Westcott	4¾	5	1.05 to 1
Victor	4 5/16	4½	1.04 to 1
Black Crow	4⅜	4½	1.03 to 1
Continental	4⅜	4½	1.03 to 1
Cutting	4⅜	4½	1.03 to 1
Whiting	3¼	3⅜	1.03 to 1
Zimmerman	4 15/16	5	1.01 to 1
Auburn	4	4	1 to 1
Austin	5½	5½	1 to 1
Badger	4	4	1 to 1
Carhartt	4	4	1 to 1
Clark	4	4	1 to 1
Cole	4	4	1 to 1
Crawford	4½	4½	1 to 1
Diamond T	5	5	1 to 1
Duryea	3¾	3¾	1 to 1
Fires'ne-Columbus	4	4	1 to 1
Halladay	4	4	1 to 1
Jonz	4½	4¼	1 to 1
Kenmore	4	4	1 to 1
Luverne	4	4	1 to 1
Paterson	4	4	1 to 1
Pickard	4	4	1 to 1
Rambler	4½	4½	1 to 1
Roader	3⅝	3⅝	1 to 1
Staver-Chicago	4	4	1 to 1
Virginian	5	5	1 to 1
Welch-Detroit	5	5	1 to 1
Cameron	3⅞	3¾	.99 to 1
Maytag	5 1/16	5	.99 to 1
Sears	4⅛	4	.97 to 1
Adams-Farwell	5½	5	.91 to 1
Imperial	4 15/16	4½	.91 to 1
Cameron	3⅞	3½	.90 to 1
Kenmore	4½	4	.89 to 1
Zimmerman	4½	4	.89 to 1
Schacht	5⅛	4½	.87 to 1
Gleason	4¾	4	.84 to 1
Rogers	4¾	4	.84 to 1
Zimmerman	4¾	4	.84 to 1
Independent	5⅛	2½	.49 to 1

Comparing Average $1000 Licensed and Independent Cars

Licensed $1,000 Car

Horsepower	22.6
Bore, inches	3.96
Stroke, inches	4.26
Piston displacement, cu. in.	195.5
Wheelbase, inches	101½
Front tires, inches	31.8 x 3.4
Rear tires, inches	31.8 x 3.4
Number cylinders	Four
Cylinder type	L-head
Cylinders cast	Pairs
How cooled	Water
Circulation	Thermo-syphon & Pump
Ignition	Dual
Radiator	Tubular
Clutch	Multiple disk
Gearset	Selective
Drive	Shaft



Licensed $2,500 Car

Horsepower	33.9
Bore, inches	4.55
Stroke, inches	4.90
Piston displacement, cu. in.	326.8
Wheelbase, inches	119.
Front tires, inches	35.0 x 4.0
Rear tires, inches	35.0 x 4.1
Number cylinders	Four
Cylinder type	L-head
Cylinders cast	Pairs
How cooled	Water
Circulation	Pump
Ignition	Dual
Radiator	Cellular
Clutch	Cone
Gearset	Selective
Drive	Shaft

ON this and the following page are graphically illustrated what might be termed the eight representative cars of the independent and A. L. A. M. interests. They are brought side by side, not so much for the purpose of drawing comparison between them, but rather that the reader can grasp exactly what the actual trend of construction in motors and other parts is at the present time.

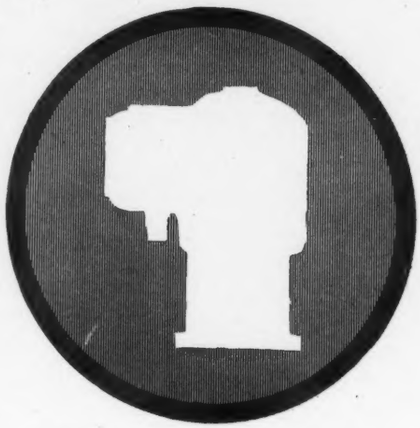
The general inferences given on these pages are in no sense guessworks or approximations, but are actual facts. In order to get this information Motor Age received from every manufacturer in the country a signed document showing the different details of construction in their different models for the present year. These facts about the cars are brought together in long series of tables, six pages of which are published on the independent cars in another part of this issue.

The complete specifications of all the American chasses have been taken and divided into four great classes, namely, $1,000, $1,500, $2,500, and $4,000. These, Motor Age believes, represent the four great divisions of the car price situation today. The $1,000 car embraces everything from $1 to $1,250. The $1,500 car embraces from $1,250 to approximately $2,250. The $2,500 car embraces everything from $2,250 to $3,000. The $4,000 car includes everything over this $3,000 mark.

All of the independent cars have been classified under these four grand divisions; and all of the A. L. A. M. cars are similarly divided. The actual number or percentage of cars in the different classes using particular construction is not given here, but is given on the following pages. To explain: The $1,000 licensed car is shown as having L type cylinders. All of these cars have not the L type, but the L type is in the lead over the T type, or the valve-in-the-head type, and being in the majority it is selected as being the representative cylinder type for this price of licensed car.

In so far as horsepower is concerned, it is the actual horsepower in each case that is given, this actual having been obtained by the average horsepower of all the cars in the class. The same applies to each of the four independent as well as the four licensed cars. What applies to horsepower, applies with equal significance to cylinder bore, piston stroke, piston displacement, wheelbase, front tires and rear tires.

A few general inferences relative to the four different types cannot be overlooked. The $1,000 car of the licensed and independent parties are set side by side. The licensed motor is more powerful and runs to the long-stroke type. Some readers may wonder why the A. L. A. M. car with 3.96 bore has a higher horsepower than the independent car with 4.06 bore when the horsepower is rated on the cylinder bore. This is explained by the fact that there are in the



Independent $1,000 Car

Horsepower	19.86
Bore, inches	4.06
Stroke, inches	4.06
Piston displacement, cu. in.	176.2
Wheelbase, inches	99
Front tires, inches	31.2 by 3.1
Rear tires, inches	31.2 by 3.1
Number cylinders	Four
Cylinder type	L-head
Cylinders cast	Separately
How Cooled	Water
Circulation	Thermo-syphon
Ignition	Single
Radiator	Tubular
Clutch	Cone
Gearset	Selective
Drive	Shaft

Independent $2,500 Car

Horsepower	37.40
Bore, inches	4.31
Stroke, inches	5.05
Piston displacement, cu. in.	321.5
Wheelbase, inches	119
Front tires, inches	35 x 4.1
Rear tires, inches	35 x 4.2
Number cylinders	Four
Cylinder type	L-head
Cylinders cast	Pairs
How cooled	Water
Circulation	Pump
Ignition	Dual
Radiator	Tubular
Clutch	Cone & Multiple Disk
Gearset	Selective
Drive	Shaft

Comparing Average $1500 Licensed and Independent Cars

Independent $1,500 Car

Horsepower	30.45
Bore, inches	4.18
Stroke, inches	4.63
Piston displacement, cu. in.	262.5
Wheelbase, inches	115
Front tires, inches	32.5 x 3.7
Rear tires, inches	32.5 x 3.7
Number cylinders	Four
Cylinder type	L-head
Cylinders cast	Pairs
How cooled	Water
Circulation	Thermo-syphon
Ignition	Dual
Radiator	Tubular
Clutch	Cone
Gearset	Selective
Drive	Shaft

Independent $4,000 Car

Horsepower	43.33
Bore, inches	4.85
Stroke, inches	5.50
Piston displacement, cu. in.	466
Wheelbase, inches	125
Front tires, inches	35.3 x 4.25
Rear tires, inches	35.8 x 4.5
Number cylinders	Four
Cylinder type	L-head
Cylinders cast	Pairs
How cooled	Water
Circulation	Pump
Ignition	Dual
Radiator	Cellular
Clutch	Multiple disk
Gearset	Selective
Drive	Shaft

independent party many single and two-cylinder cars, so that the average horsepower is lower than what would be indicated by the cylinder bore.

The licensed car has a slightly longer wheelbase, uses larger tires, and differs from the independent in two respects: First in that it uses dual ignition, as compared with single on the independent, and employs a multiple-disk clutch as compared with the cone type. It further differs in that its cylinders are cast in pairs, whereas those of the independent are cast separately. Both cars are alike in the use of L cylinder types, selective gearsets, and shaft drive.

Putting the two $1,500 cars side by side, the most striking feature is that the two are very closely allied in most respects. The independent has a slightly greater horsepower but the cylinder bore is a little less. The independent wheelbase measures 2 inches more than that of the other. When it comes to tires the A. L. A. M. is a leader by more than an inch in the tire diameter. From a point of view of piston displacement there is not a cubic inch difference between the average A. L. A. M. and the average independent. When it comes to the matter of other parts it will be noted that the independent, like the other, uses cylinders cast in pairs and of the L type. The independent uses thermo-syphon, whereas the pump is used on the licensed car. Both use dual ignition, tubular radiators, selective gearsets and shaft drive. Again, there is a difference in clutches, the license using a multiple disk, whereas the independent uses the cone.

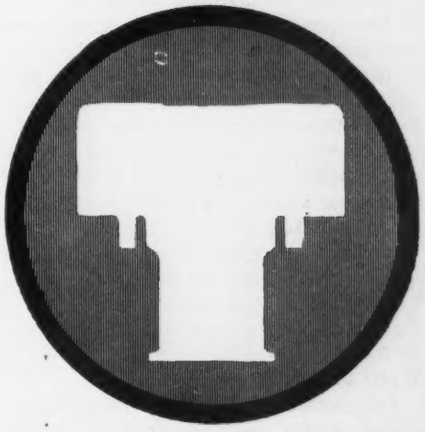
Looking at the $2,500 car, the independent has the higher horsepower. Both are alike in wheelbase. The independent has the smaller piston displacement. Tires are practically alike, this being the only division in which this occurs. Both use the same type of L-head cylinders cast in pairs, with pump circulation. Both use dual ignition. There is a difference in that the license employs a cellular radiator, the independent a tubular. This is the first division in which the cellular has made its appearance as a leader. Once again there is a difference in clutches, the licensed has changed from the disk in the two smaller sizes of average cars to the cone type, whereas the independent has an equal representative of cone and disk.

Lastly, when the $4,000 cars are placed side by side, some close comparisons are noted. The licensed has two-thirds of a horsepower greater with a slightly greater bore and a little less stroke. It has 2 1/2 more cubic inches of piston displacement. The independent has a wheelbase 2 inches longer. In the matter of tires the licensed car is a big leader.

For the first time it is noted that the T-head cylinder has supplanted the L type, this occurring in one case only, namely, the $4,000 licensed car.

Licensed $1,500 Car

Horsepower	28.6
Bore, inches	4.20
Stroke, inches	4.65
Piston displacement, cu. in.	261.6
Wheelbase, inches	113
Front tires, inches	33.7 x 3.9
Rear tires, inches	33.7 x 3.9
Number cylinders	Four
Cylinder type	L-head
Cylinders cast	Pairs
How cooled	Water
Circulation	Pump
Ignition	Dual
Radiator	Tubular
Clutch	Multiple disk
Gearset	Selective
Drive	Shaft



Licensed $4,000 Car

Horsepower	44.0
Bore, inches	4.90
Stroke, inches	5.28
Piston displacement, cu. in.	468.6
Wheelbase, inches	123
Front tires, inches	36.2 x 4.3
Rear tires, inches	37.6 x 4.6
Number cylinders	Four
Cylinder type	T-head
Cylinders cast	Pairs
How cooled	Water
Circulation	Pump
Ignition	Dual
Radiator	Cellular
Clutch	Multiple disk
Gearset	Selective
Drive	Shaft

The $1,000 Car of the Independent Manufacturers

Statistics Demonstrate That $1000 Car Has 99-inch Wheel-Base as Compared With 92-inch Last Year. Other Growths

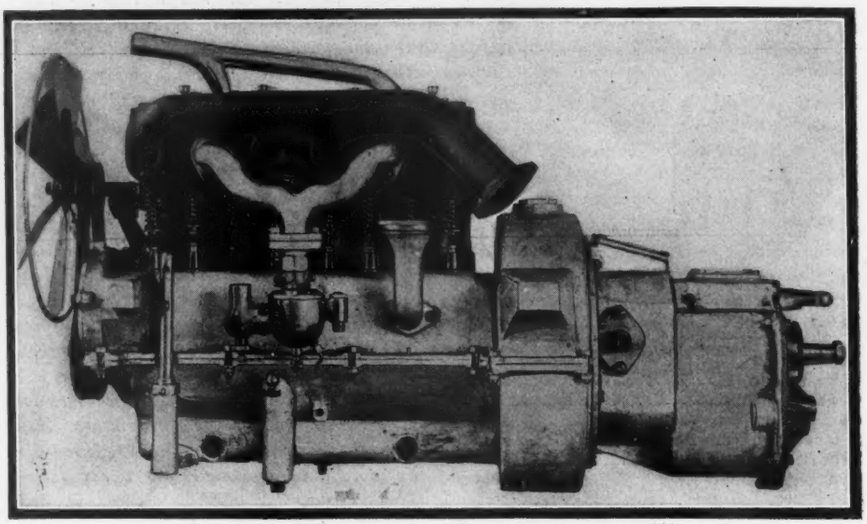
HERE it is—the $1,000 independent car for 1911. The word independent is used to distinguish this car from the average $1,000 car as made by the four score or more companies which are members of the Association of Licensed Automobile Manufacturers. The average $1,000 independent car is bigger than it was a year ago, but it still has to grow a little before it will be as big as that built by the A. L. A. M. members. In a sentence, it is 20-horsepower, 4-inch bore, 4 1/5 inch stroke, 99 inch wheelbase, has 1-type cylinders (they are cast separately), it is water cooled by thermo-syphon circulation, it uses a tubular radiator, has a single high-tension ignition system, uses circulating oiling system, possesses a cone clutch, is provided with a three-speed selective gearset, uses shaft drive and has a gravity feed of gasoline to the carbureter.

Few Changes Noted

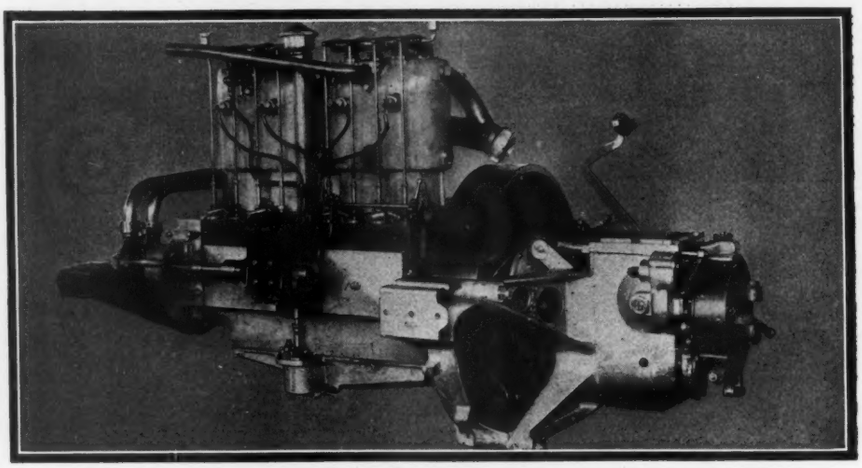
The $1,000 car of this year is little different from that of a year ago, excepting in details. The wheelbase has increased from 92 to 99 inches, and whereas the car last year had a multiple-disk clutch, this year it has a cone one. But although the general lines or characteristics of design have changed but little, there has been a most pronounced accent given to certain phases of construction that last year seemed a little uncertain. To explain: The percentage of those makers building this price of car using L head cylinders has jumped from 58 to 61 per cent. This is not a big leap, but it tells the story. It says that makers are learning the problems of manufacture and it tells that it is cheaper to build an L-type of motor than it is one with a T head.

Water Cooling Increases

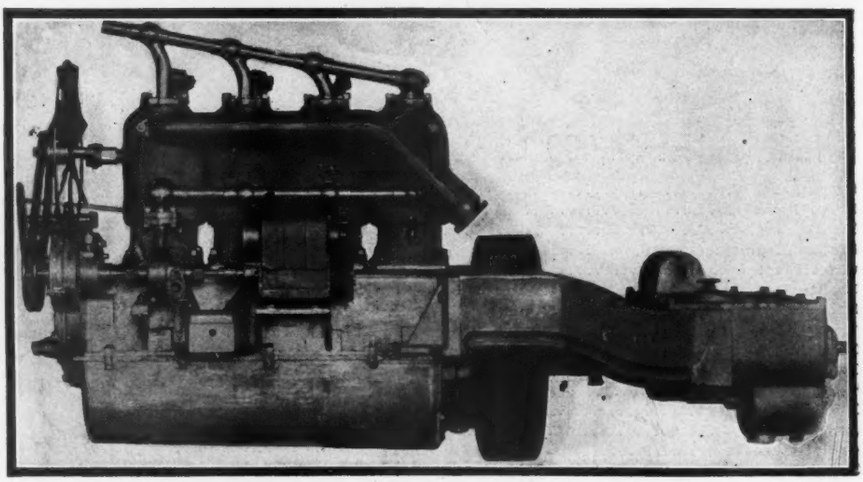
The percentage of those using water-cooled motors has jumped from 71 per cent last year to 92 per cent this year. This is in keeping with the great trend of present-day construction. There was a time when many thought the air-cooled motor would rule in the low-powered field, but these figures seem to point in another direction. In connection with cooling it cannot be overlooked that thermo-syphon water circulation has risen from 72 per cent a year ago to 85 per cent this year, and by next year it will be still higher. Thermo-syphon is bound to come still more in cars of this class, and it will be a steady but perhaps slow gainer in cars of the higher classifications.



BADGER FOUR-CYLINDER MOTOR WITH UNIT CONSTRUCTION



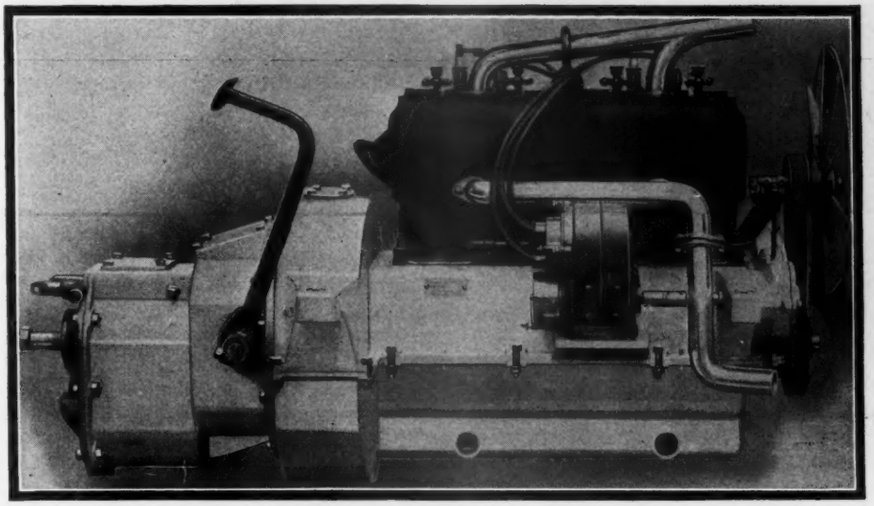
MAGNETO SIDE OF DORRIS UNIT POWER PLANT



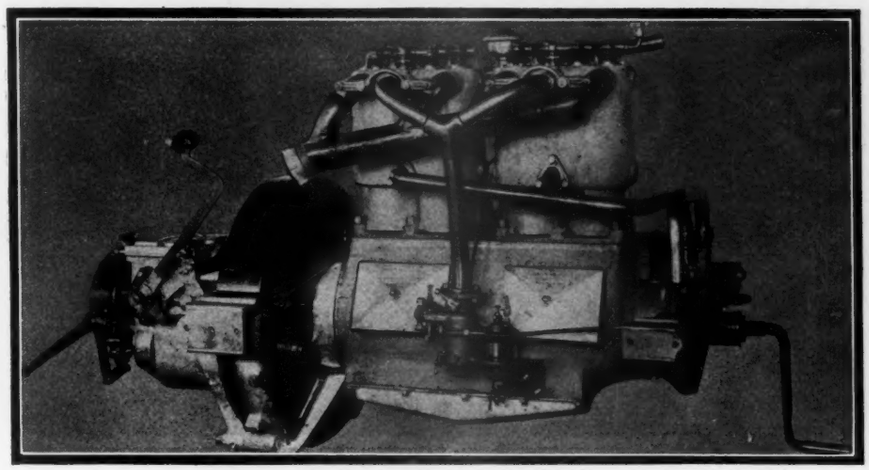
UNIQUE MOTOR AND GEARBOX OF MODEL GAS ENGINE CO.

For 1911 Much Bigger One Than Its Predecessor

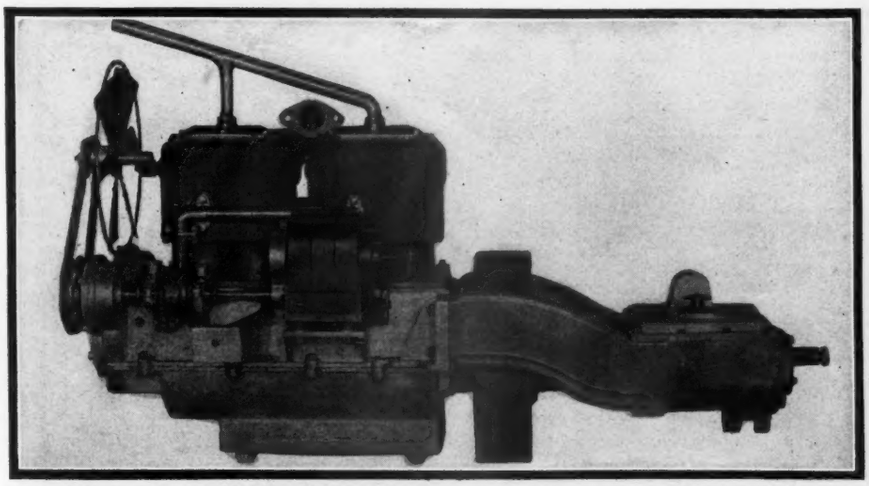
This Car Has Increased From 17 to 19 Horsepower and Has Grown in Many Other Respects Over the Car of 1910



MAGNETO AND PUMP ON THE PATERSON MOTOR



DORRIS 1911 MOTOR WITH ENCLOSED CIRCULATING OILING



MODEL GAS ENGINE MOTOR WITH TWIN CYLINDER CASTINGS

There has been a tremendous gain in the use of the cone clutch. Last year it had a following of but 15 per cent; this year it has risen to 49, having jumped into the lead over the multiple-disk.

Use of Single Ignition

The use of the single ignition system has grown from 39 per cent a year ago to 51 per cent this year, and in the total beats out the combined forces of the dual and double types.

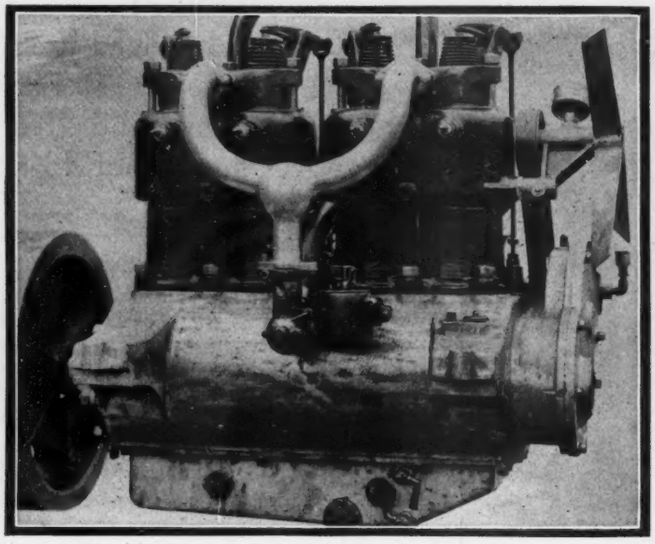
Shaft drive is more firmly entrenched than ever, which has been due to some extent to the vanishing of the motor buggy during the past year.

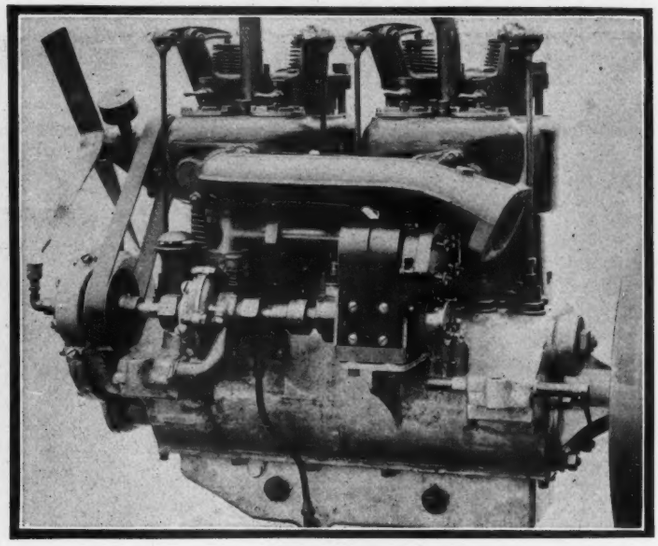
To set the student at rest, herewith follows the real story of the $1000 car in tabulation form, and it is printed side by side with the $1000 independent car of a year ago and also with the $1000 A. L. A. M. car of this year. Some may say that comparisons are odious; not necessarily so. In this case comparison tells a great story—a story which is a credit to both parties; a story which tells in unmistakable words that the great motor industry of this country is moving along in one direction, whether the makers belong to one organization or to another.

This story tells that in spite of the Selden patent or any other patent that under all classifications, whether legal or otherwise, the great current of design is toward the same end. Here follows the table:

Car part	1911 A.L.A.M.	1911 Ind.	1910 Ind.
Horsepower	22.6	19.86	17.2
Bore, inches	3.96	4.06	3.83
Stroke, inches	4.26	4.17	4
Piston displce., cu. in	195.5	176.2	129.2
Wheelbase, inches	101.5	99	92
	Percent	Percent	Percent
T. cyl. type	6	16	23
L cyl. type	68	58	61
Valve-in-head	23	18	15
Two-cycle	3	8	0
Cyl. cast sep.	31	49	54
Cyl. cast pairs	47	19	23
Cyl. cast en bloc	22	32	23
Air-cooled	0	29	8
Water-cooled	100	71	92
Thermo-syphon	50	72	85
Water pump	50	28	7
Tube radiator	75	87	..
Cellular rad.	25	13	..
Single ignition	25	51	39
Dual ignition	66	31	30
Double ignition	9	18	30
Circulating oiler	75	60	54
Mechanical oiler	19	33	15
Flywheel oiler	3	5	8
Mul.-disk clutch	60	38	61
Cone clutch	30	49	15
Sel. gearset	74	62	31
Planetary gearset	16	17	38
Friction gearset	10	16	15
Shaft drive	84	77	62
Chain drive	16	23	38
Gravity feed	94	98	100
Pressure feed	6	2	0

The Average $1500 Car of the Independent Maker





BOTH SIDES OF THE ABBOTT-DETROIT MOTOR WITH INTAKE VALVES IN THE CYLINDER HEADS

The $1500 Independent Car Has More Horsepower Than the Corresponding One in the A. L. A. M. Ranks Today

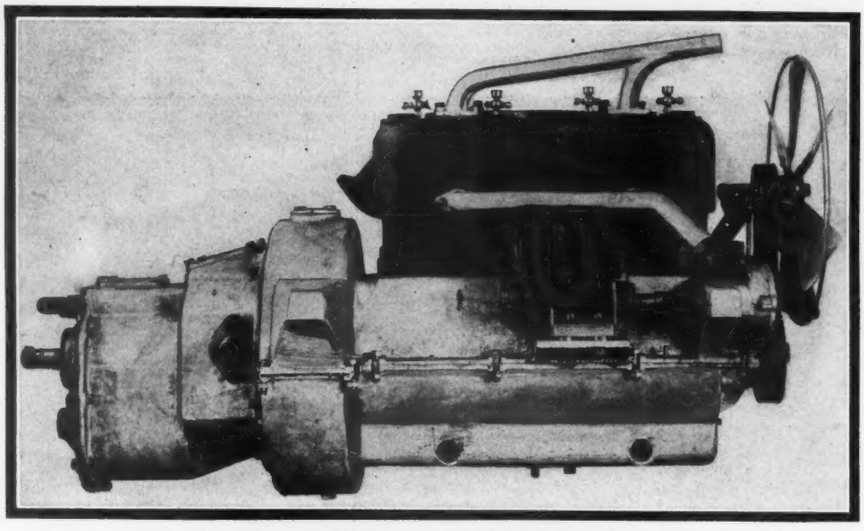
TO THE devotees of the $1,500 independent car let it be said that this certain vehicle is a big brother compared with the one of a year ago. It has grown in almost every direction and last, but by no means least, it is a bigger machine than the $1,500 car of the A. L. A. M. makers for this year. Gentle reader, bear in mind this means the average car.

The $1,500 car is a big one, almost 31 horsepower—to be exact, 30.45—and this is horsepower calculated by the A. L. A. M. formulæ. Its wheelbase is 115 inches, as compared with 109 last year, and it is bigger than the 113-inch wheelbase of the A. L. A. M. average car this year.

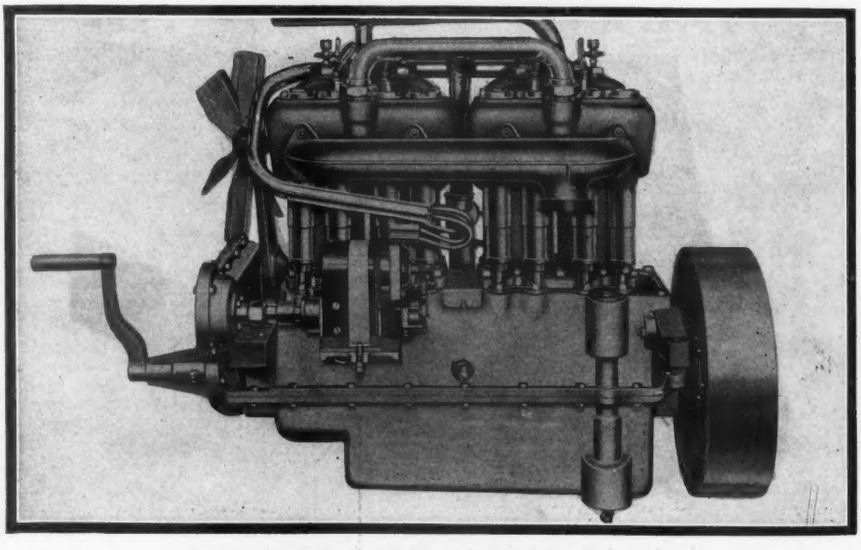
Features of the $1,500 Car

But these figures may not interest you; then turn to the features, the real characteristics of the 1911 independent car; the cardinal points of it, if the term may be used. It uses L type cylinders, is a four-cylinder design, has the cylinders cast in pairs, employs thermo-syphon water cooling, carries a tubular radiator, is fitted with dual ignition, has a circulating oiling system, carries a cone clutch, boasts of a three-speed selective gearset, is shaft driven and feeds the gasoline to the carbureter by gravity.

Next come some real comparisons—comparisons which show how much it has grown and along what lines during the past year, and comparisons on its measured strength with the present A. L. A. M. $1,500 car. It shows a dropping away from

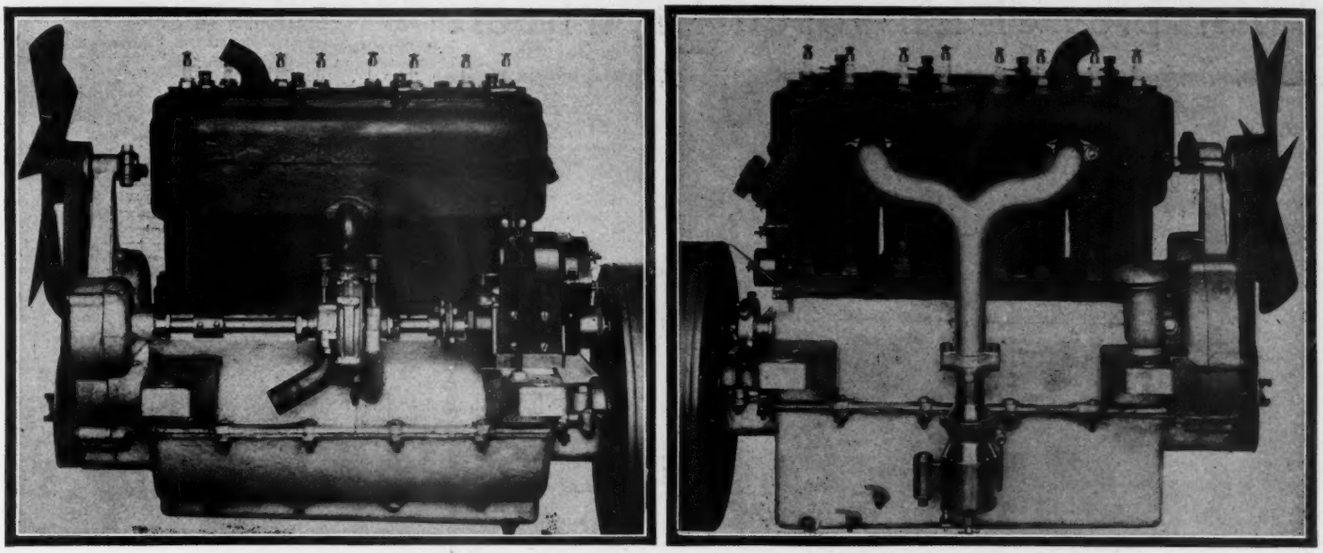


SHOWING CIRCULATING OILING ON THE BADGER MOTOR

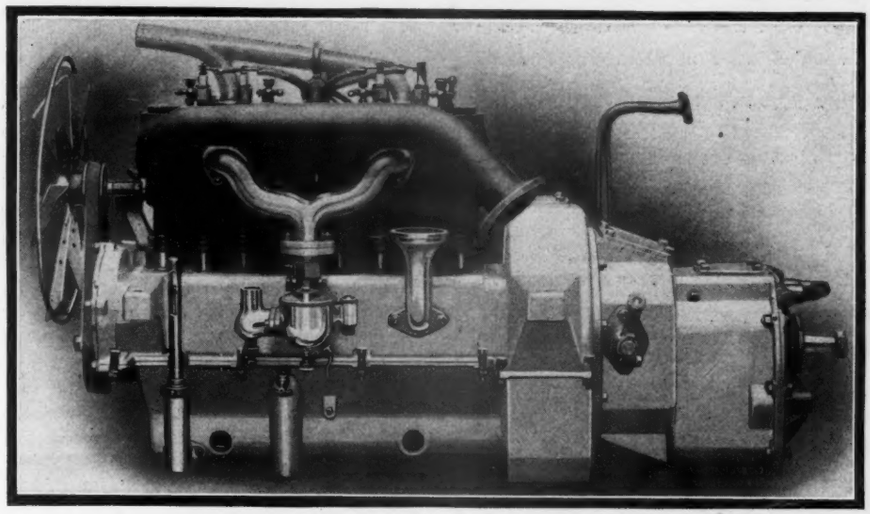


THE EXCELSIOR MOTOR USED IN THE FALCARS

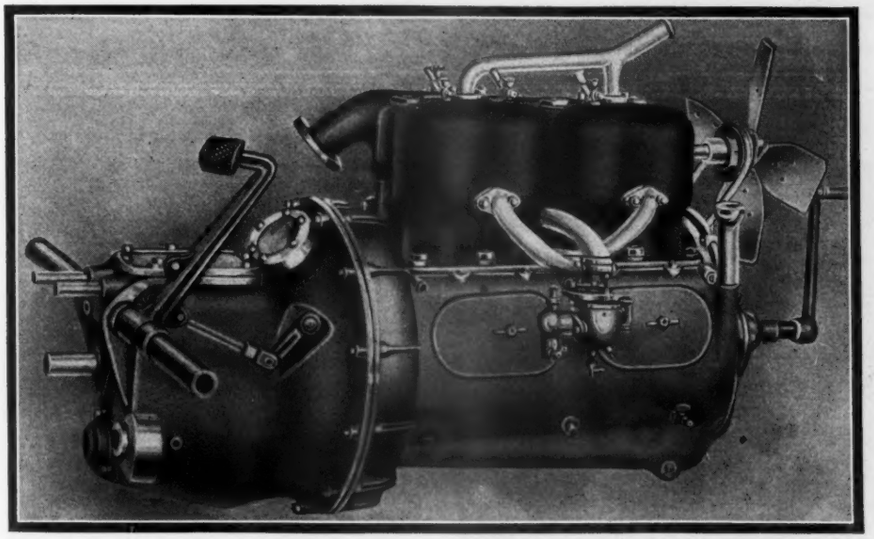
Shows Much Increase in Horsepower and in Other Ways



THE MONOBLOC MOTOR DESIGN USED ON THE WARREN-DETROIT CARS



UNIT POWER PLANT OF THE 1911 PATERSON CAR



UNIT POWER PLANT OF THE ALPENA CARS

Compared With the $1500 of One Year Ago the Present One Has Longer Wheelbase, and Larger Sizes in Tires

the T-type cylinder head and an adoption of the L type. The T design has diminished and the L increased. In this respect it leads its A. L. A. M. brother.

Cylinders Cast in Pairs

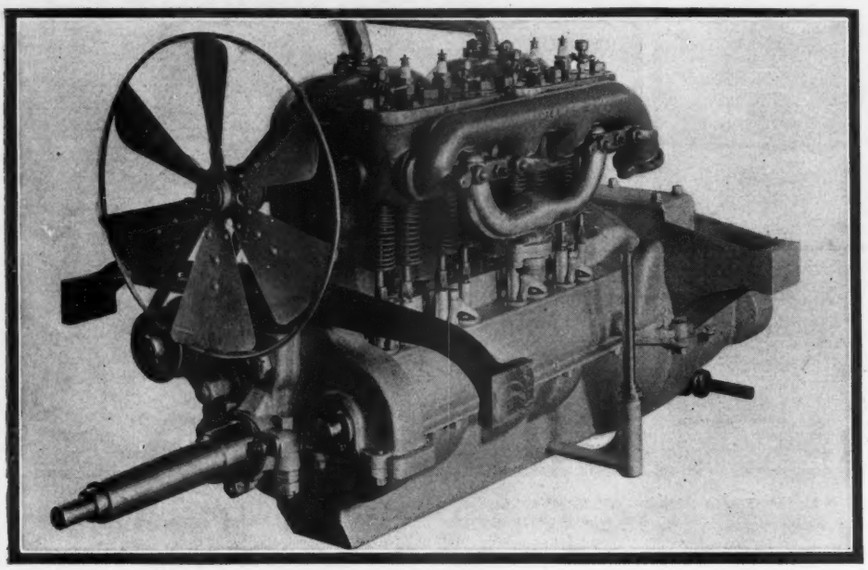
Last year this car had separately-cast cylinders, but this year it uses them cast in pairs. This is in keeping with the great trend of construction in the medium and high-class field. The use of the enbloc casting has gained slightly—only 2 per cent, having risen from 15 to 17 per cent in the 12 months.

Here again is recorded a pronounced thermo-syphon victory. Last year the percentages were thermo-syphon 45 and pump 40, but this year it is thermo-syphon 75 and pump 25. The tubular radiator is a three-to-one leader over the cellular type. It is a four-to-one leader in the $1,500 A. L. A. M. car. It is only when you get into the higher-priced machines that the cellular design comes to the front.

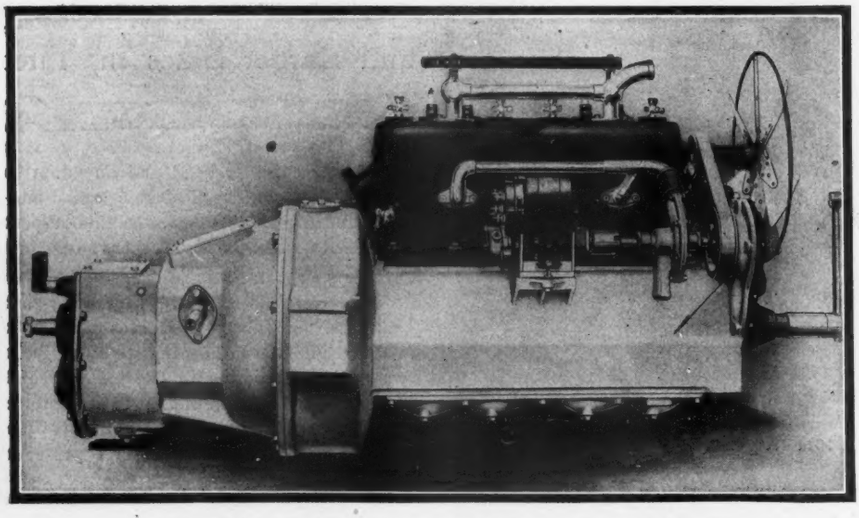
Ignition Tendencies

The ignition growth of the year is a little unsettled; both the single and double systems have gained and the dual has lost. The gains have been very, very small. The single jumped from 15 to 16 per cent, and the double from 20 to 22 per cent, and necessarily the dual dropped from 65 to 62 per cent. But the dual is still a big leader. You cannot explain why this is. Some who used the dual last year experienced some difficulties and have adopted the single or

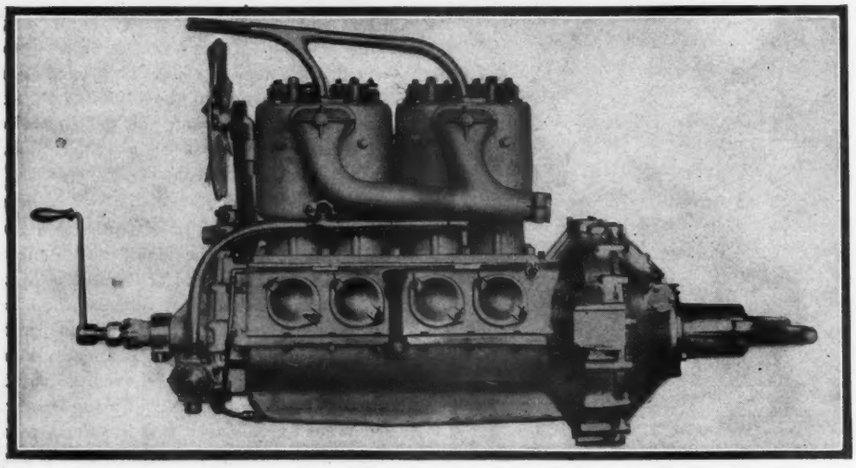
Examples of Enclosed Flywheels



IMPERIAL WITH SEPARATE TRANSVERSE SUPPORT IN FRONT



RAISED WATER PIPES OVER THE MAGNETO ON COLE MOTOR



THE BROWNELL VALVE-IN-THE-HEAD MOTOR

double. Then, too, improved and simplified double systems have been brought out at reduced prices, also improvements in the magneto have made the single system more possible. All told the ignition situation would seem to favor an improved double or a more dependent single. It may be the added selling value of a double ignition system has had something to do with the increase in the use of it.

Looking over the oiling system of the motor it records but another chapter in the conquest of the circulating oiling system. Last year it had but 60 per cent of the following and this year it has 95 per cent, in reality 98 per cent, with but 2 per cent left to the now almost obsolete mechanical lubricator. The cleanliness and efficiency of the circulating oiling system have been the factors that have forged it to the front. The circulating system is not only more efficient, but it is also more economical. One filling of oil is generally sufficient for 600 miles.

The Transmission System

Leaving the motor and going to the transmission system of this $1,500 independent car, it must not be overlooked that the wave of progress has traveled considerably during the year that has just been ushered into history. Both the multiple-disk and the cone clutches have gained. This means that the planetary gearset has dropped a good deal and that the expanding and contracting band clutches have been eliminated. The cone clutch led last year by the narrow margin of 5 per cent and it leads this year by the same small margin. In the A. L. A. M. ranks the multiple-disk clutch is the leader on the average car by a percentage of 50 to 38 as compared with the cone type. It will be interesting to watch this fight during the coming 12 months. Many like the multiple-disk, many like the cone, and it is a certainty that it will be the public demand in the end that will decide which will be the eventual winner.

Question of Gearsets

Coming to the question of gearsets, it is nothing but the selective set. It has 97 per cent of the followers; the planetary has not a single follower, and there are only 3 per cent friction devotees. The conquest of the selective gearset has been as pronounced and decisive as that of the circulating oiling system or the L type of cylinder. In connection with the gearset, just note that shaft drive has a 95 per cent following and would have more were it not for the friction drive clientele. And then in the same breath look at a 95-per cent following of gravity feed gasoline as compared with 5 per cent for pressure.

In a paragraph contrast this independent car with that of the A. L. A. M. field. Herein they are both alike in that they use L type cylinders, cast in pairs, tubular radiator, dual ignition, circulating oiling, selective gearset, shaft drive and gravity

gasoline feed. Here follow the points in which they differ: The A. L. A. M. uses pump water circulation, the independent thermo-syphon; the A. L. A. M. has a multiple-disk clutch, the independent a cone; and the independent is 2 horsepower the greater.

Trend in Design

For the benefit of those who wish to study the trends of designs in this priced car in the two big divisions of this year, the following table setting forth the respective specifications of the A. L. A. M. and independent cars are given, as well as those of the independent for a year ago. Here is the table:

Car part	1911 A.L.A.M.	1911 Ind.	1910 Ind.
Horsepower	28.6	30.45	26.6
Bore, inches	4.20	4.18	4.10
Stroke, inches	4.65	4.63	4.31
Piston displce., cu. in.	261.6	262.5	226.2
Wheelbase, inches	113	115	109
	Percent	Percent	Percent
T cyl. type	13	9	20
L cyl. type	58	81	75
Valve-in-head	26	10	5
Two-cycle	13	0	0
Cyl. cast sep.	20	22	50
Cyl. cast pairs	60	60	35
Cyl. cast en bloc	20	17	15
Air-cooled	6	0	15
Water-cooled	94	100	85
Thermo-syphon	33	75	45
Water pump	66	25	40
Tube radiator	80	71	..
Cellular radiator	20	29	..
Single ignition	16	16	15
Dual ignition	71	62	65
Double ignition	13	22	20
Circulating oil	84	95	60
Mechanical oiler	10	2	10
Flywheel oiler	6	3	10
Mul.-disk clutch	50	45	40
Cone clutch	38	50	45
Sel. gearset	85	97	65
Planetary gearset	0	0	20
Friction	12	3	10
Shaft drive	87	95	75
Chain drive	13	5	25
Gravity feed	90	95	95
Pressure feed	10	5	5

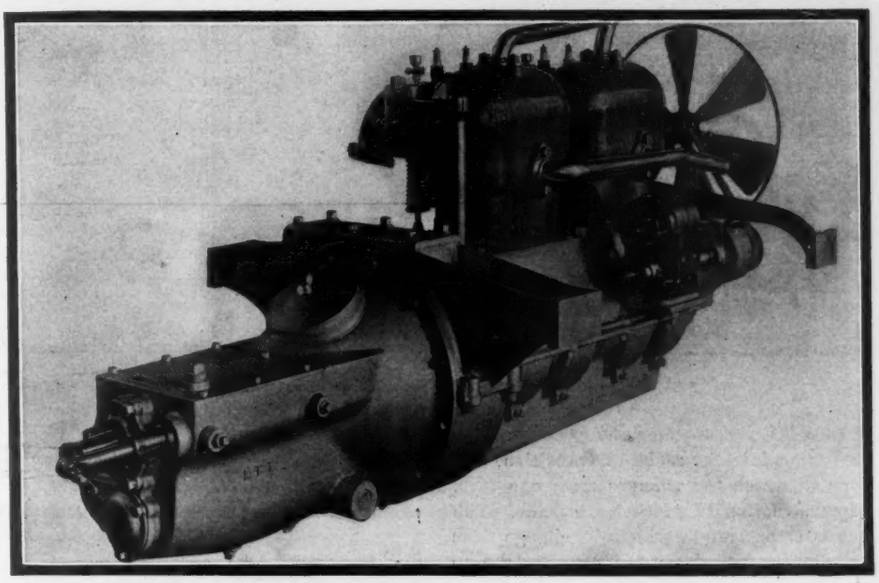
Some of the Contrasts

Looking over the three columns in this table, a few contrasts appear and many agreements. Both the A. L. A. M. and the independent agree with 60 per cent of the motors having the cylinders cast in pairs. Both have 16 per cent fitted with single ignition. The independent is a big leader in the use of the L cylinder casting; it leads in the selective gearset and in thermo-syphon cooling.

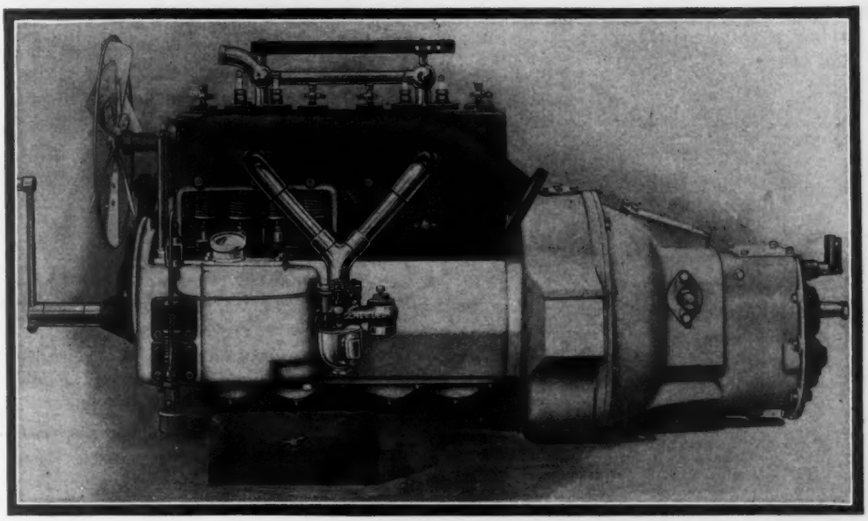
One thought should be carried away—namely, both divisions of makers are pointing in the same direction. Perhaps this year they differ in a few respects, but they will eventually come together.

The $1,500 car is not yet a settled quantity. When it comes to the $4,000 the design shows but little change over that of a year ago, but not so with the $1,500 machine. The $1,500 car has represented the real whirlpool of the industry. It has been the fighting ground on which the hottest battles of the industry have been waged. The net result is that some makers have been giving more in one way and less in another. One maker has used too small tires in order to give more of something else that would be a good talking point to make sales.

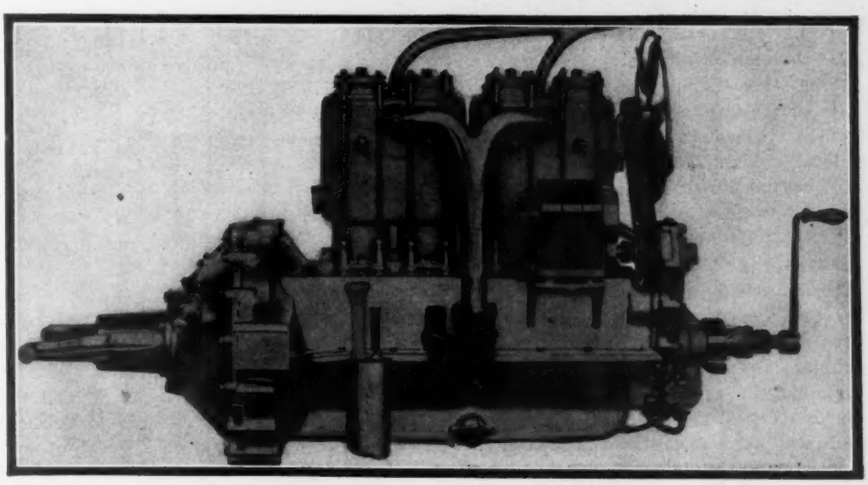
Unit Plants With Enclosed Clutches



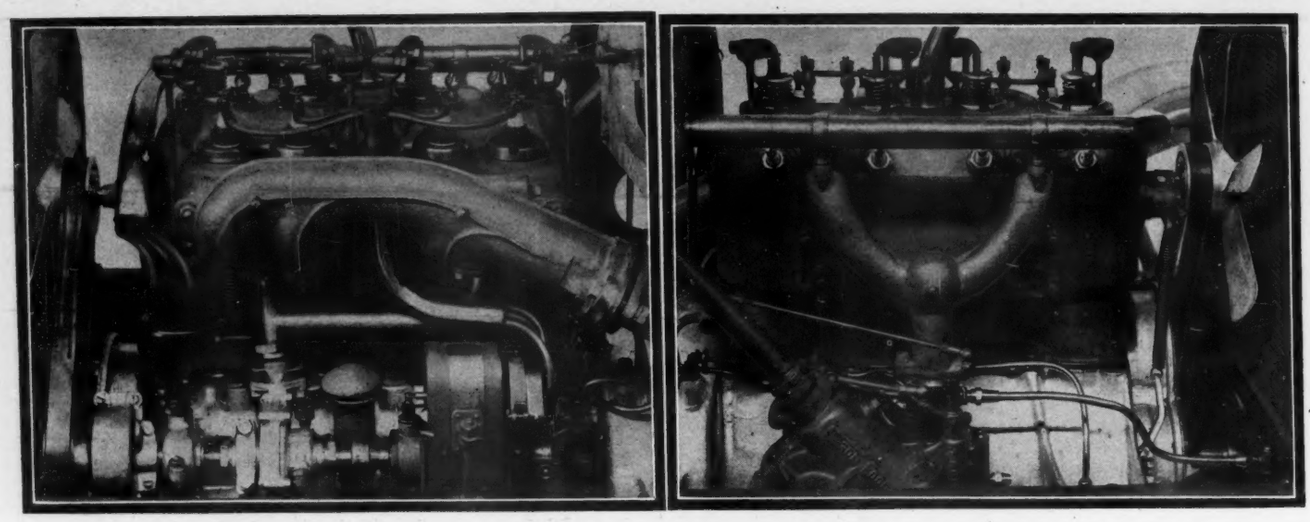
UNITED GEARBOX AND MOTOR ON THE 1911 IMPERIAL CARS



OIL PUMP AND CARBURETER ON COLE UNIT POWER PLANT



THE BROWNELL MOTOR WITH ENCLOSED FLYWHEEL AND CLUTCH



THE 1911 BERGDOLL HAS MONOBLOC CYLINDER CASTINGS WITH INTAKE VALVES IN THE HEADS

The $2500 Average Car Resembles

WHEN you examine the $2,500 car you get into the realm of transition, that zone in which the changes from one form of construction to another are made. You get into the zone in which the change from certain cheaper phases of manufacture to more costly ones is made; in a word, you notice the transition from tubular to the cellular radiator; the dropping of thermo-syphon circulation; the more general adoption of the cylinders cast in pairs; the more general acceptance of the multiple-disk clutch and also of the dual ignition system.

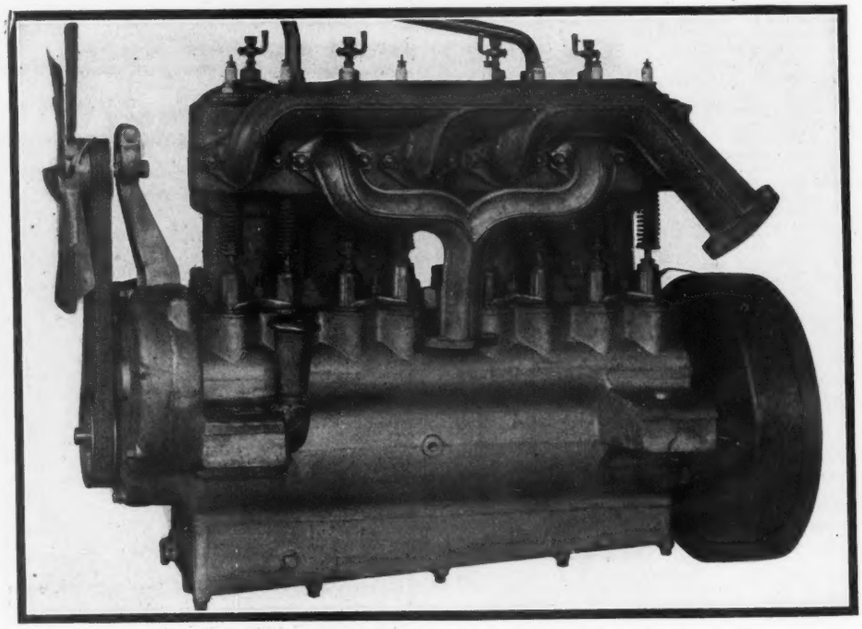
Independent Horsepower Greater

If you are at all interested in the independent $2,500 car, it may help out to know that it is a 37.4 horsepower machine, almost a clear 4-horsepower more than its A. L. A. M. brother. It is practically 5 horsepower more than its predecessor of a year ago. It has grown in stature during the year, its wheelbase having lengthened from 114 to 119 inches, so that now it is a tie with the A. L. A. M. machine, which has this identical wheelbase. Great minds seem to think alike whether they are inside the Selden fold or outside of it.

Uses Disk Clutch

If you are going to buy a 1911 car and you want to get as close as possible to what the average 1911 $2,500 independent car is, why see that it has 4 cylinders; that they are cast in pairs; that they have L-type cylinders, which are water-cooled by pump circulation; that a tubular radiator is used; that dual ignition is fitted; a circulating oiling system; either a multiple-disk or cone-clutch, because each has a percentage of 45; a three-speed selective gear-set; shaft-drive; and gravity feed of the gasoline. The independent and A. L. A. M. $2,500 average cars are alike in nearly all respects, excepting that the A. L. A. M. uses a cellular radiator, the independent a tubular; the A. L. A. M. has a multiple-disk clutch; the independent is equally disposed towards cone and multiple-disk, and in all other respects their general characteristics are alike.

Now begin a rather piecemeal analysis of this new $2,500 car. It uses the L-head cylinder, but the T-head is gaining as compared with their relative positions in the $1,000 and $1,500 average cars. In the $1,000 car it is 16 to 58 per cent of the T and L types; in the $1,500 product it is 9 to 81 per cent; and now in the $2,500 machine it is 28 to 65 per cent. This shows a very perceptible gain—a gain which is the same in the A. L. A. M. ranks. It will be remembered that in the A. L. A. M. category the T-head leads in the $4,000 car, but it is a fact that in the $4,000 independent car the L-type leads. This means that of the eight average cars, the four average ones in the A. L. A. M. and the four average ones in the A. L. A. M. there is only one in which the T-head of cylinder leads the L-type, and that is the $4,000 A. L. A. M. product.

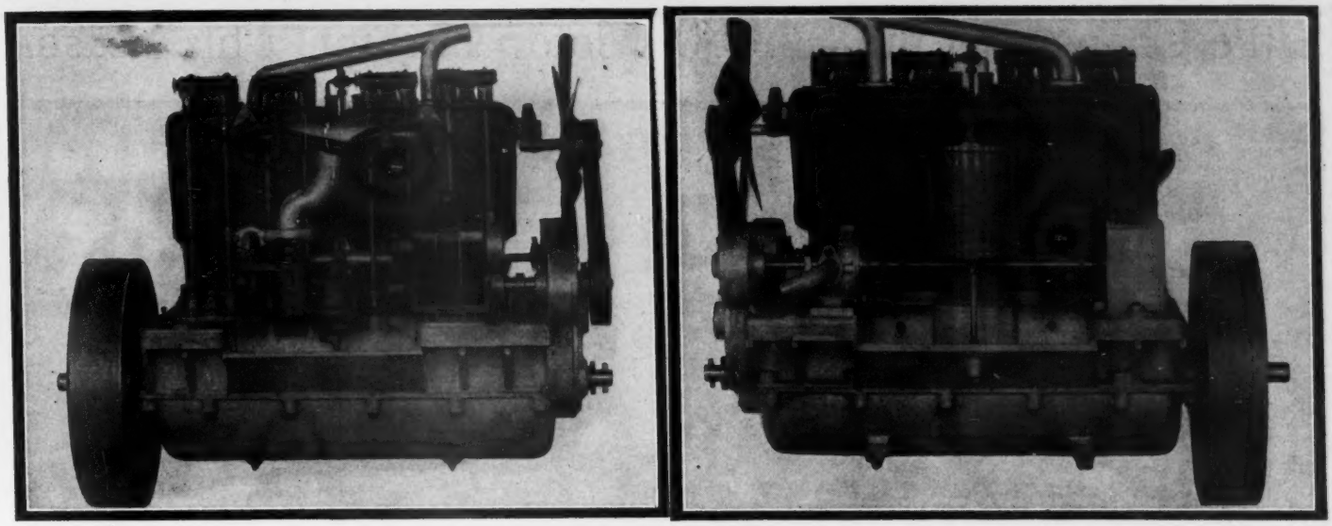


OIL FILLER AND MANIFOLDS ON THE 1911 VELIE MOTOR

The method of casting cylinders in pairs gains in the ascending scale of drives. In the independent class the separate casting rules this year in the $1,000 car; the cast in pairs has a narrow margin in the $1,500 machine, and this margin of victory is increased in the $2,500 car.

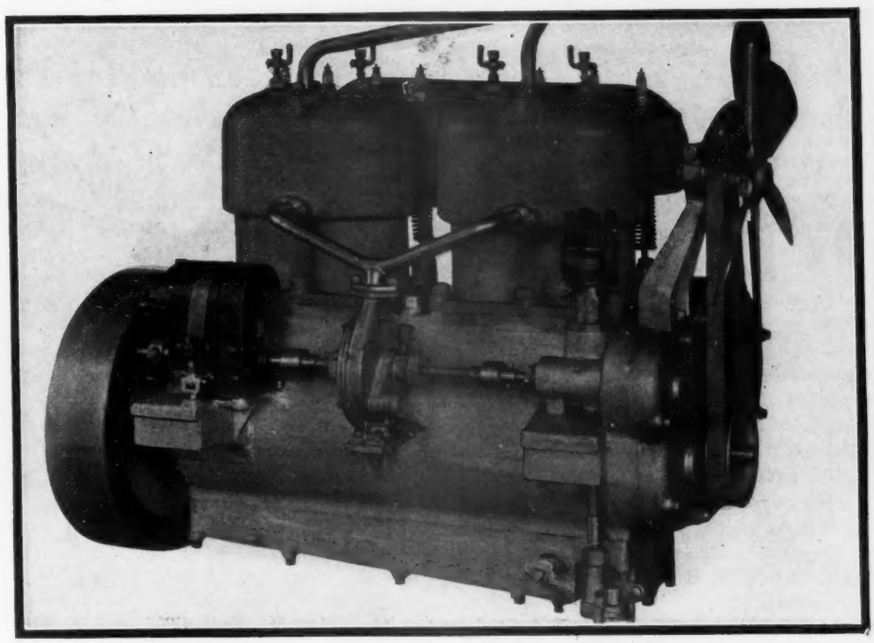
No Air-Coolers Noted

The air-cooled motor is not represented in this classification, the whole 100 per cent going to the water-cooled motor. And when it comes to the circulation of the water the palm is carried off by the pump, which has downed the thermo-syphon system at a 97 to 3 ratio. In this respect, too, there is a general progression from the thermo-syphon to the pump in the rising scale of prices from the $1,000 machine, through the $1,500 type up to the $2,500 one and thence on to the $4,000 machine.



BOTH SIDES OF THE 1911 CINO VALVE-IN-THE-HEAD MOTOR WITH MECHANICAL OILING SYSTEM

That Used by Leading Makers Today



VELIE WITH MAGNETO, OIL PUMP, TIMER-DISTRIBUTOR AND WATER PIPES

In Europe the thermo-syphon motor has big representation, but the American maker has not yet seen fit to landslide to it. Perhaps when he sees what the show-me John Bull, the scientific German and the impulsive Frenchman are doing, that he, too, will then cast in his lot with them the same as he has done with the selective gearset and shaft drive.

Here in this $2,500 car we find the fight waging close between the tubular and cellular radiators, with the tubular a leader by 57 to 43 per cent. This is not a very big margin.

This average car registers a strong vote for dual ignition. There is no question about it, because the single system is shoved down to 7 per cent, the double held at 37 and dual crowned victor with 56 per cent. Last year the double led, but now the tide is flowing in the other direction. The pendulum of change swings slowly in many details, but if you watch long enough it is sure to change in the direction of public demand.

Last year the circulating oiler was just two to one compared with the mechanical type, and this year it is nearly six to one. This is a big gain. At that it is a little behind the licensed division, where the ratio is over eight to one.

In the transmission story it is nothing very new. The cone and multiple-disk clutches run a neck-and-neck race with 45 per cent each. In both of the preceding classes the cone was a winner, but it has to share victory in this class. In the $4,000 car, which will be spoken of later on, the multiple-disk wins out by a fairly good majority. Here again pause and note the trend which seems to be from cone to multiple-disk, as the prices rise through the gamut of the four average cars.

In selective gearsets it is a home run with a full 100 per cent, and the planetary, progressive and friction, entirely crowded off the board. The same story is true with respect to shaft drive. In gravity feed of gasoline there is a dropping off to 70 per cent, with a healthy growth for the pressure-feed devotees.

In the $2,500 car there are but two respects in which the average car of the A. L. A. M. association differs from that of the independents. The first is that it uses a cellular radiator as compared with a tubular on the independent, and secondly it uses a multiple-disk clutch, whereas the multiple-disk and cone are on even terms in the independent.

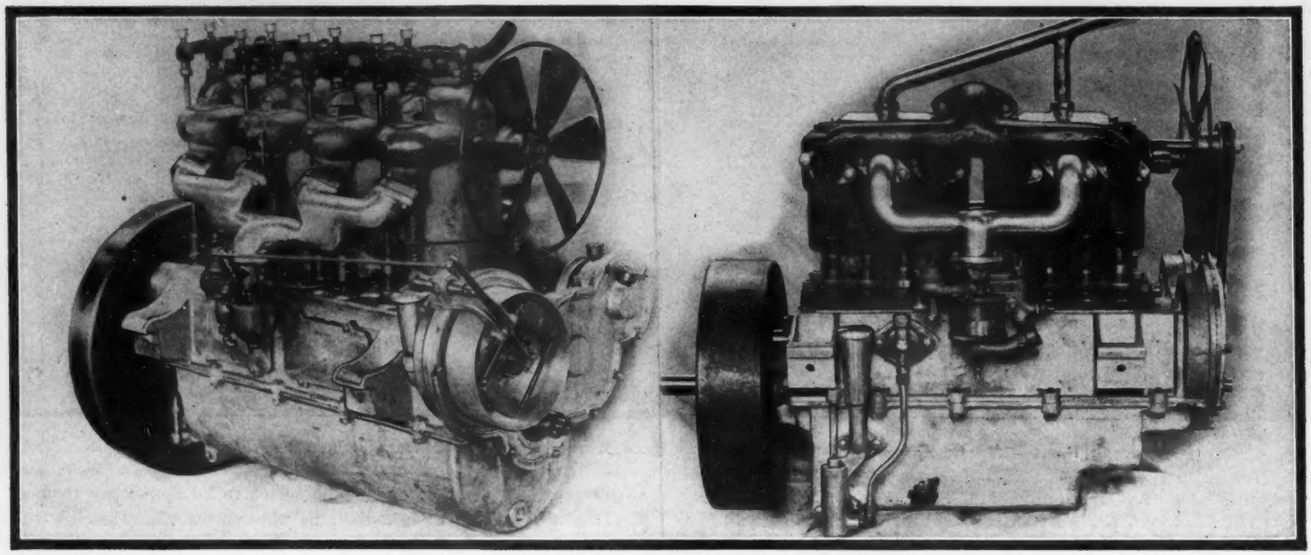
There are many other points in which healthy comparisons exist between these two cars, as shown by the following table.

Table of Comparisons

It will also be noted by scanning the table that the independent car of this year, compared with that of a year ago, shows growth along many lines. Here follows the table:

Car Parts	1911. A.L.A.M.	1911. Ind.	1910. Ind.
Horsepower	33.9	37.40	32.7
Bore, inches	4.55	4.31	4.41
Stroke, inches	4.90	5.05	4.89
Piston displacem't, cu. in.	326.8	321.5	413.5
Wheelbase, inches	119	119	114
T cyl. type, per cent	28	28	28
L cyl. type, per cent	49	65	56
Valve-in-head, per cent.	20	7	8
Two-cycle, per cent	3	0	8
Cyl. cast sep., per cent.	20	38	24
Cyl. cast pairs, per cent.	72	62	76
Cyl. en bloc, per cent.	8	0	0
Air-cooled, per cent.	3	0	0
Water-cooled, per cent.	97	100	100
Thermo-syphon, per cent.	3	3	20
Water pumps, per cent.	97	97	80
Tube radiator, per cent.	35	57	..
Cellular radiator, per cent	65	43	..
Single ignition, per cent.	13	7	8
Dual ignition, per cent.	44	56	44
Double ignition, per cent.	43	37	48
Circulating oiler, per cent	87	82	56
Mechanical oiler, per cent	10	15	28
Flywheel oiler, per cent.	3	3	16
Mul.-disk clutch, per cent	33	45	52
Cone clutch, per cent.	54	45	40
Sel. gearset, per cent.	95	100	96
Planetary gearset, per ct.	0	0	4
Friction gearset, per cent.	0	0	0
Shaft drive, per cent.	100	100	92
Chain drive, per cent.	0	0	8
Gravity feed, per cent.	80	70	92
Pressure feed, per cent.	20	30	8

Little Changes in the $4,000 Motor Car for This Season



TWO TYPES OF MODEL GAS ENGINE CO. MOTORS WITH SEPARATE AND BLOCK CYLINDERS

The Wheelbase Has Dropped From 126 to 125 Inches—The Motor Has 43 Horsepower, Which Is 2 More Than Last Year—The L Type of Cylinder Head Carries With the Majority

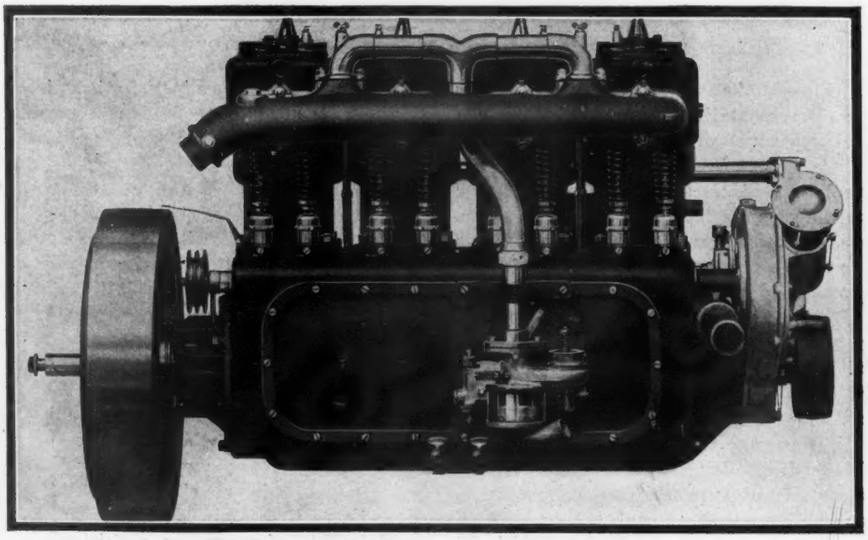
IT IS only after you have reached the hilltop that you can properly survey the entire landscape and it is only after you have climbed all the way up through the $1,000, $1,500, $2,500 classes to the $4,000 machines that you get the real estimate of the trends of the times. Before, however, taking a general survey of the motor car situation, examine for a moment closely the $4,000 car and contrast it with that of a year ago. It is a four-cylinder type, has cylinders of the L design cast in pairs, it is water-cooled with pump circulation, uses a cellular radiator, has dual ignition, employs a multiple-disk clutch, a three-speed selective gearset, shaft drive and gravity gasoline feed. It differs from its three smaller brothers in using cellular radiator and the multiple-disk clutch. It agrees with the $4,000 A. L. A. M. car in every respect; it is the only average car in which both divisions agree in every respect.

Some of the Differences

Compared with the $4,000 car of a year ago it is a little smaller. To explain: The wheelbase has been shortened from 126 to 125 inches. The average A. L. A. M. car has a wheelbase of 123 inches. From these figures it would seem that the public wants a wheelbase of about 124 inches for cars of this price. There is no use of a wheelbase being too long and it is an excellent indication that the makers realize that enough is better than too much: A meal is better for the digestive organs than a feast.

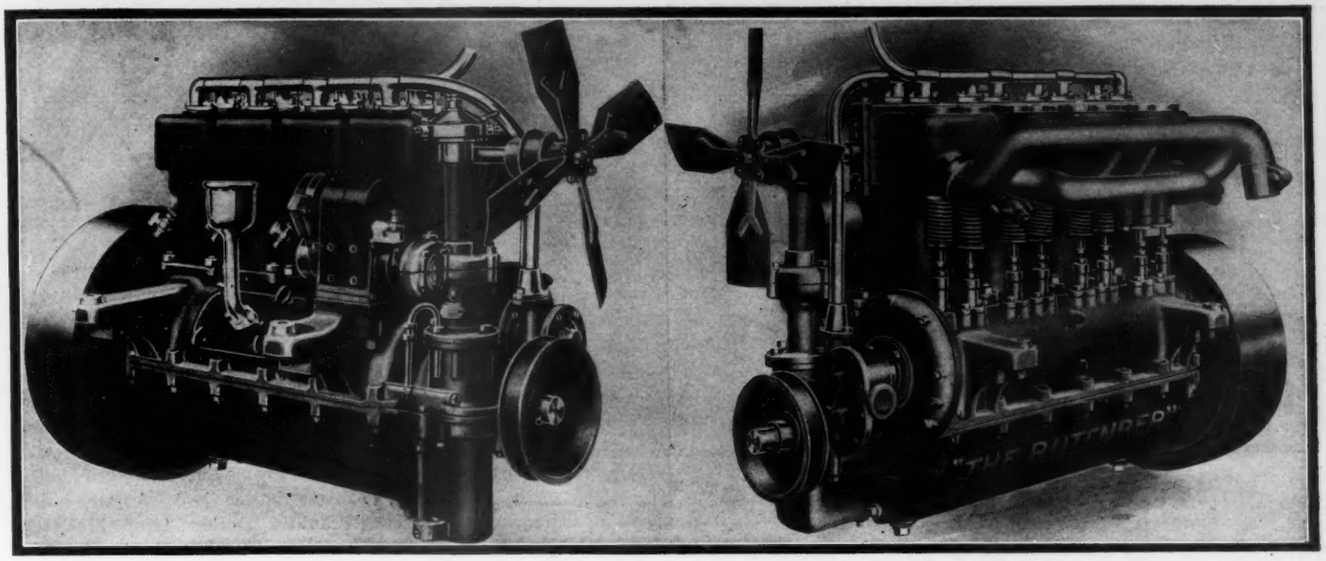
Every average car in the independent ranks uses an L cylinder type. The $4,000 type and all of the three lower divisions, namely, $1,000, $1,500 and $2,500, employ the L type. The T type allows of a more symmetrical arrangement of the motor appurtenances, such as carbureter, magneto, water pump and manifolds. It also allows of larger diameter valves. With the T head motor and a two-spark magneto a high efficiency can be obtained. The T type calls for two camshafts and a larger crankcase and so is more expensive to manufacture, but it would seem that the makers agree that the extra cost of manufacture is more than offset by the advantages gained by separating the valves.

Compared with a year ago the average $4,000 independent car has grown in several directions. It shows a marked increase from 26 to 47 per cent in the use of the L type of cylinder casting. It shows an increase in the use of the valve-in-the-head motor, and a most decided drop in the use of the T head motor. Last year the average independent $4,000 car used a T head motor with a percentage of 58, but this year it has dwindled to 19. This is perhaps accounted for by the big rush from the independent ranks during the last year to the A. L. A. M. fold.



THE ONE RAMBLER TYPE OF MOTOR USED ON ALL CHASSIS

Compared With That of Year Ago; Wheelbases Shorter



THE RUTENBER MOTOR AS USED ON THE WESTCOTT CARS FOR 1911 SEASON

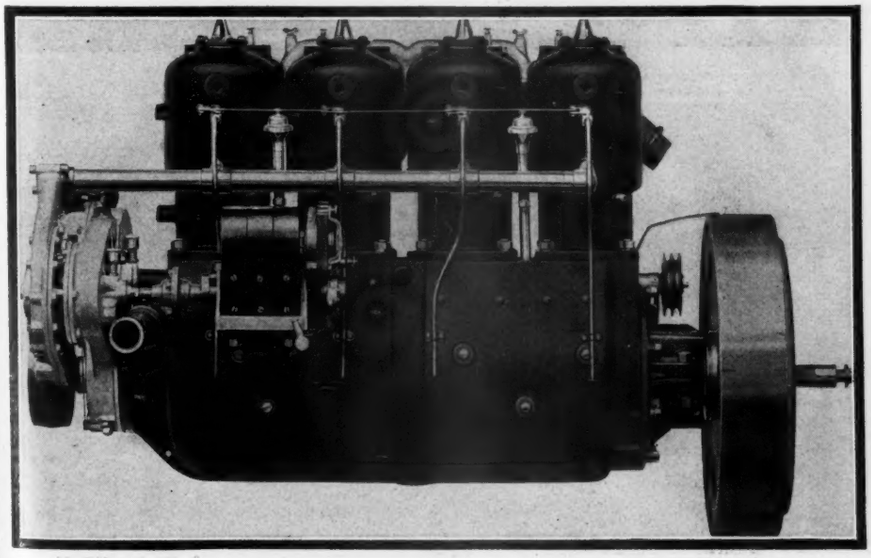
Compared With the $4,000 A. L. A. M. Average Car, It Shows Practically the Same Horsepower Has Much Smaller Tires, the Wheelbase Is 2 Inches Longer, Cylinders L Type

The en bloc motor is without status in this class this year, the same as it was last year. In the A. L. A. M. class 3 per cent uses the one-block casting. Air-coolers have dropped from 7 to 3 per cent, so that now the percentage of air-coolers is lower than in the licensed division.

There has been a perceptible growth in the use of the water-cooled, the figures showing an increase from 93 to 97 per cent. Thermo-syphon has gained 3 per cent and pump circulation lost a like amount. The problem of pump or thermo-syphon cooling has yet to be solved by the designers of motor cars.

In the ignition field there has been a general feeling in favor of the dual system which must be accepted as the leading system of the year, in that it leads in the average car irrespective of the class. It was expected that the double set would prove a winner, but makers would sooner use but one set of spark plugs if they can have a satisfactory ignition set with them. The double set is more expensive and often when the idle set was wanted it was found that the plugs were fouled and had to be cleaned. In all probabilities the double-spark system eventually will supplant the dual system. It is to be expected that sooner or later the single ignition system will come into vogue and when the magneto becomes very reliable it may prove to be a leader.

The remainder of the story of the $4,000 car will if told sound like a tale that is told, because it means multiple-disk clutch, selective gearset and shaft drive.

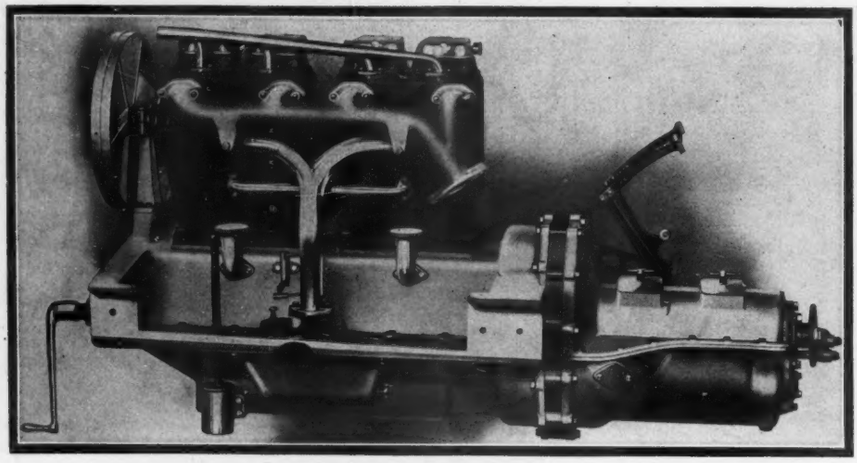


RAMBLER WITH ONE-PIECE CRANKCASE AND TUBULAR SUPPORT

Survey of Situation

Now that the hill top has been reached and all of the cars analyzed from their own view point a general survey will be in order. It will be brief. Looking first at the independent and A. L. A. M. divisions it cannot be passed over that the A. L. A. M. car is fitted with heavier tires than the corresponding independent car. The $1,000 A. L. A. M. car has front and rear tires 31.8 by 3.4 inches, whereas the independent sizes are 31.2 by 3.1 inches. On the $1,500 A. L. A. M. the sizes are 33.7 by 3.9 front and rear; in the independent the sizes are 32.5 by 3.7, averaging more than 1 inch less in diameter and a little less in tube diameter. In the $2,500 A. L. A. M. the tire sizes are 35 by 4 inches in front and rear as compared with 35 by 4.1 in the independents, showing that the latter have a little lead in this class. In the $4,000 car the big change is noted. The A. L. A. M. sizes are 36.2 by 4.3 inches in front and 37.6 by 4.6 in rear. In the independents the sizes are 35.3 by 4.25 in front and 35.8 by 4.5 in rear. This shows an advantage of nearly 2 inches average in the A. L. A. M. cars for the rear tires and a big increase for the front tires.

Thirty American Makers Build Six-Cylinder Motor Cars



CUNNINGHAM MOTOR WITH COMBINED GEARBOX

The American Six Is Generally a Bigger Car Than the Average European Six-Cylinder — Forty Chassis Types

SO far as America is concerned, the six-cylinder motor has made some sure but steady progress during the year. There are today forty different six-cylinder chassis types. They are manufactured by thirty different makers. Of these thirty some companies, like the Pierce-Arrow, build three different types; Palmer & Singer build two; Stevens-Duryea builds two; Thomas builds two; Austin builds three; Franklin builds two; McFarlan builds two, and, in fact, all of the others build one model each.

Analyzing the six-cylinder field from the point of view of horsepower alone, it is

In American Sixes the Cylinders Are Generally Cast in Pairs or Are Cast Separately

The A. L. A. M. cars show a greater preference for the T head motor all through the different classes. There is also a greater preference for the multiple-disk clutch. One cannot overlook the tendency they show towards the cellular radiator. Both divisions, that is, independents and A. L. A. M., agree with the selective gearset, shaft drive and dual ignition.

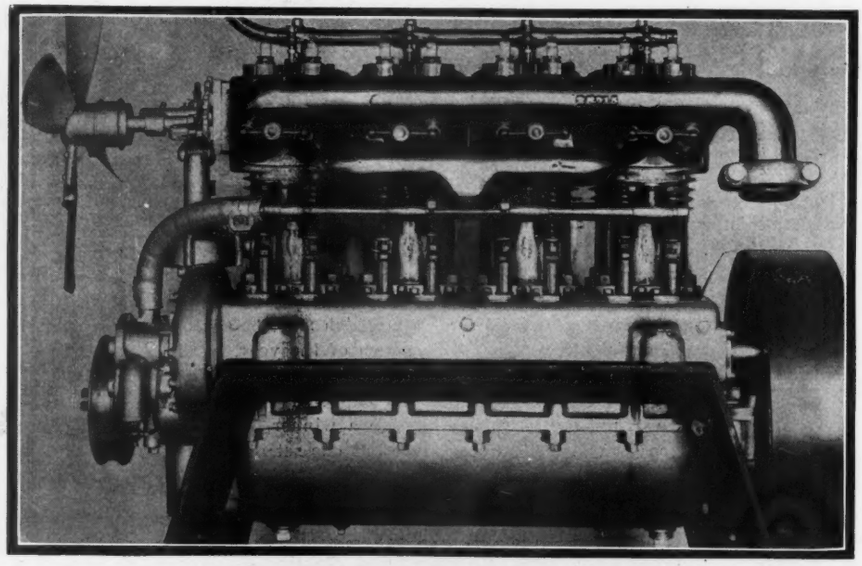
Stroke Longer Than Bore

In all four average motors of the A. L. A. M. and the independents the average motor has the stroke longer than the bore. There are very few of the real long strokes, but the feeling is evidenced everywhere that it is better to have the stroke in excess of the bore. This strong tendency is in contrast with conditions a few years ago when makers were talking the short-stroke motor, that is, the one with the bore in excess of the stroke.

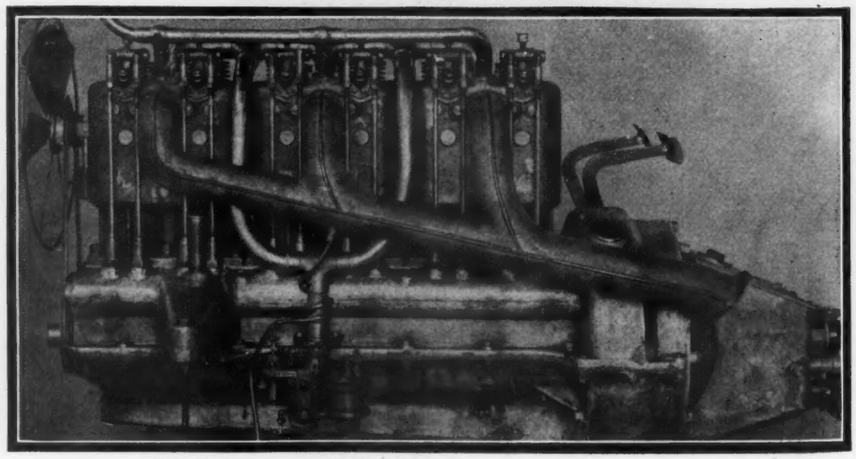
Lastly, for the benefit of those wishing to pursue the comparisons of the independent and A. L. A. M. $4,000 cars the complete averages of each are given in the following table:

THE COMPARISON TABLE

Car Parts	1911. A.L.A.M.	1911. Ind.	1910. Ind.
Horsepower	44	43.33	41.1
Bore, inches	4.90	4.85	4.82
Stroke, inches	5.28	5.50	5.15
Piston displacem't, cu. in.	468.6	466.	448.2
Wheelbase, inches	123	125	126
T cyl. type, per cent	48	19	58
L cyl. type, per cent	29	47	26
Valve-in-head, per cent	23	31	20
Two-cycle, per cent	0	3	0
Cyl. cast sep., per cent	14	24	20
Cyl. cast pairs, per cent	82	76	80
Cyl. cast en bloc, per cent	3	0	0
Air-cooled, per cent	5	3	7
Water-cooled, per cent	95	97	93
Thermo-syphon, per cent.	0	10	7
Water pump, per cent	100	90	93
Tube radiator, per cent	24	47	..
Cellular radiator, per cent	76	53	..
Single ignition, per cent	11	3	0
Dual ignition, per cent	44	55	47
Double ignition, per cent	43	39	47
Mul.-disk clutch, per cent	56	52	33
Cone clutch, per cent	36	23	53
Sel. gearset, per cent	97	100	100
Planetary gearset, per ct.	0	0	0
Friction gearset, per cent	0	0	0
Shaft drive, per cent	91	100	100
Chain drive, per cent	9	0	0
Circulating oiling, per ct.	71	65	53
Mechanical oiler, per ct.	24	28	47
Flywheel oiler, per cent	0	7	0
Gravity feed, per cent	55	65	67
Pressure feed, per cent	45	35	33



GLIDE COMBINATION AIR AND WATER-COOLED MOTOR FOR 1911



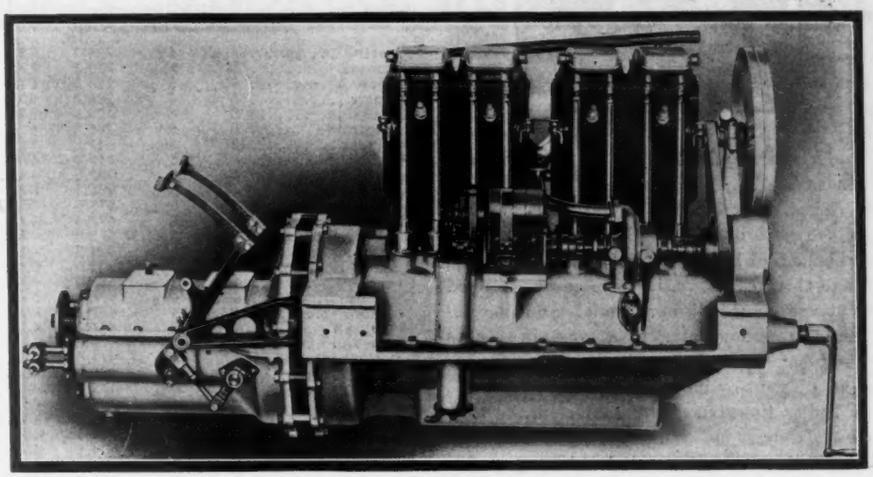
MOTOR USED IN MCFARLAN CHASSIS FOR THIS SEASON

And More Than Double This Number of European Makers

The Big Aim Is To Reduce Hood Length and Give 50 Percent Extra Efficiency and Increased Engine Flexibility

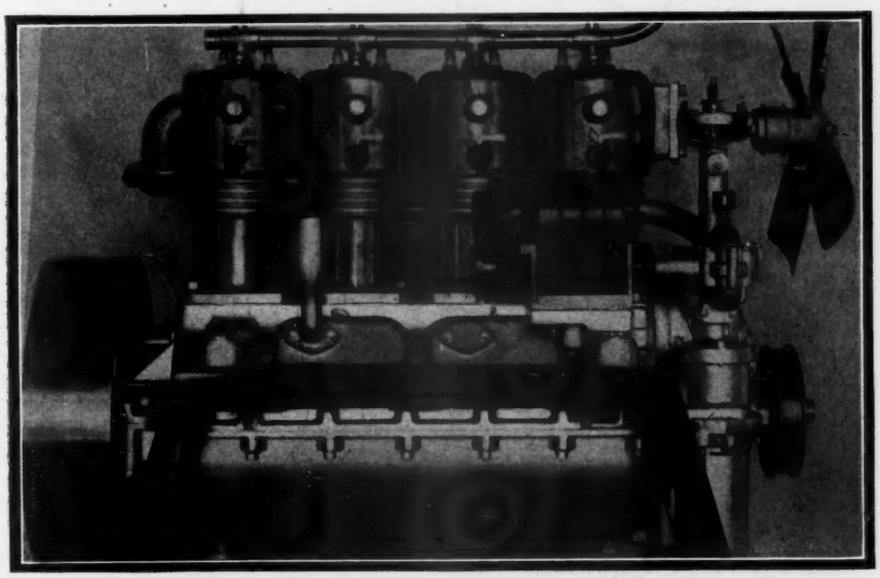
discovered that the Austin, with cylinders 5½ inches square, and the Thomas, with the same size cylinders, are the largest, having a horsepower rating of 72.6; the Pierce-Arrow comes next with 66.2 horsepower. The horsepower ranges in gradual steps from this down to 27.4, which is the smallest six listed, and is the Havers, having 3⅜-inch bore and 3¾-inch stroke.

By way of comparison with the foreign six-cylinder cars, the Napier, with 6 3/16-inch bore and 5-inch stroke, has a horsepower of 91.88. This would appear to be the highest powered six-cylinder car in the world. Normally speaking, the European six-cylinder car is not so high powered as the American six; in fact, the average horsepower of the European six is 36 horsepower, and that of the American 48. There are in Europe a great many makers who build six-cylinder cars under 40 horsepower; in fact, more than two-thirds of those building sixes have selected motors under the 40-horsepower mark. The lowest horsepower European six is the French Delahaye, with 3-inch bore and 4¾-inch stroke, giving a horsepower of 21.6. There are in Europe approximately thirty makers who build sixes that are under 30 horsepower.

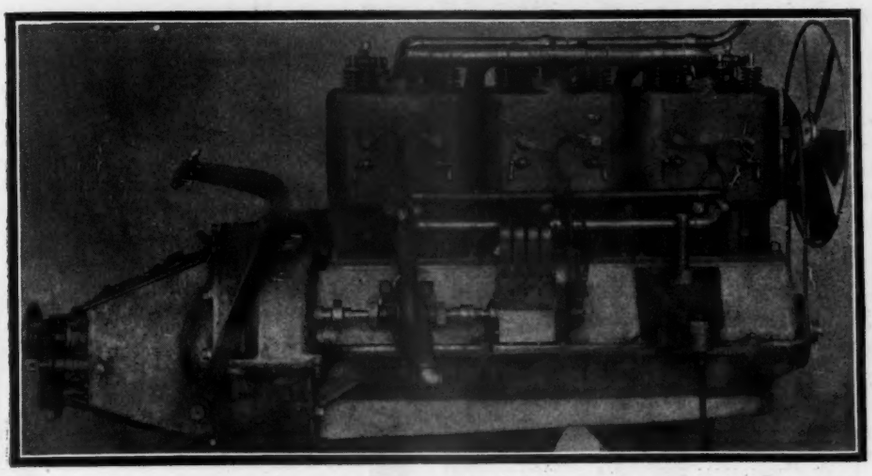


THE CUNNINGHAM MOTOR WITH VALVES IN THE HEAD

In the European Six the Use of the Monobloc Casting Has Added Much to Its Popularity



THE GLIDE MOTOR OF HOME MANUFACTURE FOR THIS YEAR



COMBINED MOTOR AND GEARBOX ON THE MCFARLAN SIX CHASSIS

When the six-cylinder situation in America is contrasted with the six-cylinder situation in Europe, as outlined in the tables herewith, in which all the American sixes are listed and nearly all of the European sixes, the reader will at once be convinced of the fact that in America the six is a big car, whereas in Europe this is not necessarily the case. It seems to have been the aim of the European manufacturer to use the six for flexibility; and in Europe flexibility is as much desired by the man who wants a medium-priced car as the man who wants the high-priced, high-powered machine. Of course the price of gasoline in Europe and the horsepower tax in England have both had their effects on keeping the size of the six down.

Sixes Are Extra

Concerning the six-cylinder situation in Europe, Motor Age's foreign correspondents have, after careful investigation, discovered that the six-cylinder has not displayed the four-cylinder models in a single factory, but that the six has always been added to meet public demands. Many of the European makers did not want the six; they did not want to build it; they thought the four met every requirement. But the public voice had to be heeded, and it was this that brought about the present increased demand for six-cylinder cars, and it was this that compels the French, German, Italian and English builders to

add the six-cylinder type to their regular lines.

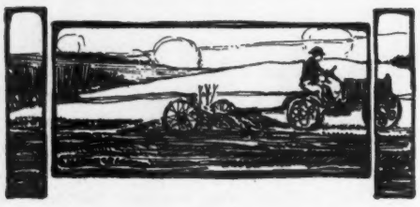
What has happened in Europe is happening right along in America. Concerns which have brought out sixes for the first time this year have, in some cases, dropped a large four-cylinder model and substituted a six-cylinder type, but in others they have added the six to their regular line of four-cylinder machines.

Today the American builder thinks that the six must be a high-powered machine. Up to the present year it has been generally understood that a six-cylinder car did not give 50 per cent more efficiency than a four-cylinder motor with the same bore and stroke; but for 1911 several of the manufacturers have come out publicly with statements and claimed to be ready to back them up with demonstrations that the six-cylinder motor will give more than 50 per cent added efficiency than the four-cylinder of the same size.

Fifty Percent More Power

It is but natural that with the early days of the six the same efficiency could not be obtained as from the four-cylinder, which at that time was a developed quantity. In the last year or 2 three or four makers, who have pinned their entire business chances on the six-cylinder motor, have gone thoroughly into the questions of six-cylinder design, and it has been this continued study of the six-cylinder needs that has brought about the present slow but steady transition to the six-cylinder motor. The six-cylinder will never live unless it can show a little more than 50 per cent efficiency over the four with the same cylinder sizes. The reason is apparent: It will be hard to convince a buyer to select a six if he is not getting something for his money. He gets added flexibility, but the expert salesman, who favors the four, can readily demonstrate to him that the flexibility range of the four will meet every requirement, so why bother with the six with its extra parts and its extra problems?

What is bringing the six-cylinder car more and more to the front today is the fact that the hood length is being reduced. In the early days of the sixes there was little room for the passengers in some of the models. Some of the makers confessed



The 1911 Six-Cylinder Motors

AMERICAN CARS

Car	Bore In.	Stroke In.	Piston Disp. Cu. In.	Horse Power
Austin	5½	5½	784.1	72.6
Thomas	5½	5½	766.2	72.6
Pierce-Arrow	5¼	5½	714.3	66.2
Belden	5	6	706.8	60
Chadwick	5	6	706.8	60
Oldsmobile	5	6	706.8	60
Peerless	5	5½	647.8	60
Palmer & Singer	4 7/8	5½	615.9	57
Austin	4½	6	588.6	48.6
Alco	4 3/4	5½	585.1	54.1
Austin	4 3/8	5¼	573.6	46.80
Belden	4½	6	572.6	48.6
Stuyvesant	4½	6	572.6	48.6
Pierce-Arrow	4½	5½	524.8	48.6
Lozier	4 3/8	5½	501.0	51.6
Premier	4½	5¼	501.0	48.6
Stevens-Duryea	4 3/4	4½	478.5	54.1
Winton	4½	5	477.2	48.6
Michigan	4¼	5	477.2	43.8
Matheson	4½	5	477.2	48.6
Pope-Hartford	4 1/8	5 3/8	471.0	44.6
Thomas	4¼	5½	468.0	43.8
Kisselkar	4½	4 3/4	453.3	48.6
Franklin	4½	4½	429.4	48.6
Locomobile	4½	4½	429.5	48.6
Mitchell	4¼	5	425.4	43.8
Stevens-Duryea	4¼	4 3/4	404.1	43.8
Klinekar	4 3/32	5	394.5	40.9
Pierce-Arrow	4	5⅛	386.4	38.4
McFarlan	4	5	377.0	38.4
Knox	5	4 3/4	373.0	60
Pennsylvania	4 3/4	5¼	372.1	54.1
Palmer & Singer	4	4 3/4	358.2	38.4
Standard	4½	5	318.1	48.6
Franklin	4	4	301.6	38.4
Klinekar	4¼	5¼	297.8	43.8
Nance	3 5/8	4 1/8	251.5	31.6
Cameron	3 7/8	3½	249.7	36.06
McFarlan	3 5/8	4	247.7	31.6
Havers	3 3/8	3 3/4	201.3	27.4

EUROPEAN CARS

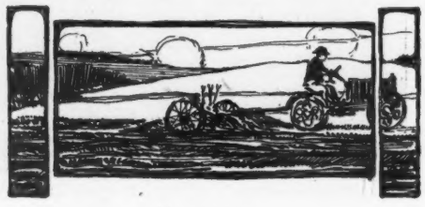
Car	Bore In.	Stroke In.	Piston Disp. Cu. In.	Horse Power
Delahaye, Fr.	3	4 3/4	134.3	21.60
Motobloc, Fr.	3⅛	4 1/16	163.0	23.43
Pengot, Fr.	3⅛	4 1/16	163.0	23.43
Arrol-Johnston	3⅛	4 3/4	145.7	23.43
Charron, Fr.	3⅛	4 3/4	145.7	23.43
Cotton-Desgouttes	3⅛	4 3/4	145.7	23.43
Darracq, Fr.	3⅛	4 3/4	145.7	23.43
D. F. P., Fr.	3⅛	4 3/4	145.7	23.43
Marlborough, Eng.	3⅛	4 3/4	145.7	23.43
Moro, Fr.	3⅛	4 3/4	145.7	23.43
Panhard, Fr.	3⅛	4 3/4	145.7	23.43
S. C. A. R., Fr.	3⅛	4 3/4	145.7	23.43
Sunbeam, Eng.	3⅛	4 3/4	145.7	23.43
Talbot, Eng.	3⅛	4 3/4	145.7	23.43
Vulcan, Eng.	3⅛	4 3/4	145.7	23.43
F. I. A. T., It.	3⅛	5⅛	157.2	23.43
Napier, Eng.	3¼	5	165.9	25.35
Leon Bollee, Fr.	3¼	4 1/16	172.2	25.35
Adams, Eng.	3 1/16	4 3/4	163.7	26.33
Unic, Fr.	3 1/16	4 3/4	163.7	26.33
Sheffield-Simplex	3 1/16	5	172.4	26.33
Brasier, Fr.	3 1/16	5½	189.6	26.33
LaBuire, Fr.	3 1/16	5½	189.6	26.33
Standard, Eng.	3½	4¼	163.5	29.40
Crowdy, Eng.	3½	5	192.4	29.40
Belsize, Eng.	3 9/16	4 3/4	189.4	30.46
Brazier, Fr.	3 9/16	4 3/4	189.4	30.46
Vauxhall, Eng.	3 9/16	4 3/4	189.4	30.46
Panhard, Fr.	3 9/16	5⅛	204.3	30.46
Wolseley, Eng.	3 9/16	5⅛	204.3	30.46
Argyll, Scot.	3 9/16	5½	219.3	30.46
Brooke, Eng.	3 5/8	4 3/4	195.3	31.53
Hotchkiss, Fr.	3¾	4 1/16	234.7	33.75
Alldays, Eng.	3¾	4½	198.8	33.75
S. P. A., It.	3¾	4 3/4	209.9	33.75
Rochet-Sch., Fr.	3¾	5⅛	226.4	33.75
Brown, Eng.	3 1/16	5⅛	176.7	37.21
Berliet, Fr.	3 1/16	5⅛	267.9	37.21
Panhard, Fr.	3 1/16	5½	267.9	37.21
Daimler, Eng.	4	5⅛	257.6	38.40
Lanchester, Eng.	4	3	150.8	38.40
Lanchester, Eng.	4	4	201.1	38.40
Napier, Eng.	4	5	251.3	38.40
Standard, Eng.	4	5	251.3	38.40
Brooke, Eng.	4 1/16	4 3/4	246.3	39.61
Leon Bollee, Fr.	4 1/16	5⅛	282.3	42.08
Brooke, Eng.	4¼	4 3/4	269.4	43.35
Austin, Eng.	4 3/8	5	300.7	45.94
Rolls-Royce, Eng.	4 1/16	4 11/16	289.9	47.26
Brasier, Fr.	4 1/16	5⅛	317.1	47.26
Sheffield-Simplex	4½	5	318.1	48.60
Thornycroft, Eng.	4½	5	318.1	48.60
Wolseley, Eng.	4½	5 3/4	365.8	48.60
Mors, Fr.	4½	5⅞	373.7	48.60
Cottin-Desg., Fr.	4 3/4	5½	389.9	54.15
Hotchkiss, Fr.	4 3/4	5½	389.9	54.15
Daimler, Eng.	4⅞	5⅛	382.6	57.03
Leon-Bollee, Fr.	4 1/16	5⅞	449.9	58.51
Dennis, Eng.	4 1/16	5⅛	392.5	58.51
Hillman, Eng.	5	5	392.7	60.00
Napier, Eng.	5	5	392.7	60.00
Italia, It.	5	5½	431.9	60.00
S. P. A., It.	5⅛	5 1/16	459.0	63.04
Leon Bollee, Fr.	5⅛	5⅞	484.8	63.04
Itala, It.	5½	5½	522.7	72.60
Napier, Eng.	6 1/16	5	601.3	91.88

this by practically confining their output to runabout types. Thanks to the common sense of our makers, the long hood is disappearing, and it is now one of the first talking points of a company that it uses a six-cylinder motor under a hood that is but 2, 3 or 4 inches longer than that required for the four-cylinder with the same cylinder sizes. In Europe the small hood has advanced further than in America, due directly to the popularity of the monobloc casting. It is common in Europe to see the six-cylinders cast in one block. This has not been done in America as yet. The American practice is to cast the cylinders in pairs, and one company has cast them in threes on some types. The monobloc casting will invade America; perhaps it will exhibit itself towards the end of this year, perhaps later; but, as in the case of the four, it will come, and when it comes it will be possible to house a six-cylinder motor under a smaller bonnet than four-cylinder types of the same size are housed today.

Objections Are Gone

Many of the early objections to the six are disappearing. When the six was new it was argued that it was impossible to get a magneto that would furnish current and properly distribute for high speeds. Ignition troubles with some six-cylinder cars in races seem to bear out this inference; however, the fact that a six-cylinder won a Vanderbilt twice in succession, and the six-cylinder touring cars have been leaders in many of the big reliability contests, has demonstrated sufficiently that the ignition difficulties have disappeared and the distribution of the current is as satisfactory as in a four.

Trouble of furnishing mixture to a six was a bugbear in the early days. With many designers it did not worry them much to get crankshafts and crankcases, but when it came to designing an intake manifold the biggest problems was encountered. Today the manifold problem has passed into the same realm of accepted design as has that of the four-cylinder, and the attention of the engineer is now centered on greater and much more important problems with reference to six-cylinder designs. The six is certain to increase during the coming season.



Some Cars Not Exhibited In New York

double-ignition system with a magneto, a four-unit coil and timer, and one set of plugs; an ingenious three-way high-tension switch being used to transfer the contacts of the high-tension cables of either system into contact with those of the cables leading to the plugs. The general construction of the car is heavier and a full shock absorber equipment is provided.

Middleby's Reading 40

In addition to the air-cooled cars brought out by the Middleby Automobile Co. for the 1910 season, a new water-cooled, racy-looking runabout model is included in the line for the season of 1911, which is designated the Reading 40. The car is made in Reading, Pa., and it has a 40-horsepower motor, hence the name. The motor has four T-type cylinders, cast en bloc, which have a bore and stroke of 5 and 6 inches, respectively. The fan-belt pulley, water pump and magneto all are on the right side of the motor with the carbureter and driven by shaft from the same gear, which is enclosed with the rest of the engine gears. In the ignition system two sets of plugs are used and both are in the inlet valve chambers, the magneto plugs being located horizontally in the side of the valve chambers and the battery set being conventionally mounted in the valve-chamber caps over the valves.

All water and gas connections are of simple design and readily accessible; the fan is an aluminum casting, and large inspection plates are provided on the side of the aluminum crankcase. The gearset is a small, compact unit with both its shafts mounted in the same vertical plane, and the aluminum gearcase is mounted on a

(Continued from page 17)

subframe with the motor. From the gearset the power is transmitted to the semi-floating rear axle by means of a propellor shaft with two universal joints that are thoroughly enclosed in metal cases, which are packed with grease. The pressed-steel frame is a double drop construction of channel section, mounted on 40-inch elliptic rear springs and 38-inch elliptic front ones. The internal brakes are operated by means of the emergency hand lever, the external ones by the pedal, and both sets operate on 14½-inch drums. Tires measure 36 by 4 inches, and the wheelbase is 122 inches.

Staver-Chicago Features

Except for slight changes and additions to the body equipment of the 1910 models, which the Staver company will continue to build, the Staver-Chicago models remain practically unchanged. But two entirely new chassis models have been added to the line, which are practically identical in design, except that one has a 35-horsepower motor, a 118-inch wheelbase and 35 by 4-inch wheels.

Both motors of the new chassis models are similar in design, having their four T-type cylinders cast en bloc and mounted on an aluminum crankcase suspended direct from the main frame. The valves in these motors are arranged on opposite sides and the heads are 2¼ inches in diameter. A constant level splash system of lubrication is used without a pump. Cooling is by means of a water circulation maintained by a centrifugal pump, and a cellular radiator is fitted.

Ignition is by means of a dual jump spark system having an S. & X. magneto and dry cells. The power from the motor is transmitted through a multiple-disk clutch running in oil, a three-speed selective Warner gearset, a propellor shaft in a torsion tube and with an enclosed universal joint at its forward end, and a floating rear axle of Smith design. The frame is a pressed steel construction of channel section, is raised over the rear axle, slightly narrowed in front, and it is mounted on elliptic springs, front and rear.

The front axle is a tubular construction, and a worm-and-sector steering mechanism is fitted. The larger model, of course, though similar in design is heavier in construction and the floating rear axle is a Sheldon pattern.

As in 1910, the Westcott line for the coming season comprises a single chassis design, but its body equipment will consist of five types, including five and seven-passenger touring cars, and two, three and four-passenger roadsters. The mechanical characteristics of the 1911 chassis are a four-cylinder Rutenber motor with the cylinders cast separately of the L type and with a bore and stroke of 4¾ by 5 inches; a leather-faced cone clutch; a three-speed selective sliding gearset, giving three forward speeds and reverse, having its shafts in the same vertical plane and mounted on Timken roller bearings, and with the gearcase supported on a subframe with the motor. The drive is by means of a propeller shaft in a torsion tube. A floating rear axle of Timken design is employed; the front axle is an I-beam construction, and the pressed channel steel frame is mounted on semi-elliptic springs.

Zimmerman Has Same Line

The Zimmerman line for the season of 1911 remains practically the same as in 1910. Its model E is a low-priced runabout for two passengers, having a two-cylinder opposed air-cooled motor, planetary gearset, shaft and chain drive and an 80-inch wheelbase. The four-cylinder chassis, brought out for the 1910 season, may be fitted with either a touring, torpedo, or roadster body, and its characteristic features are a four-cylinder motor of 35 horsepower with its cylinders cast in pairs and water cooled by means of a thermo syphon system.

Ignition is by means of a Splitdorf dual magneto system with dry cells, and a circulating splash lubrication system is employed. From the motor, power is transmitted by means of a cone clutch, a selective sliding gearset located amidships, and a propellorshaft to a semi-floating type of rear axle. The frame is a pressed channel steel construction raised over the rear axle, and it is mounted on semi-elliptic front springs and scroll elliptic rear ones. The wheelbase is 115 inches, and 34 by 3½-inch tires are used.

OUTSIDE SHOWS AT CHICAGO

Chicago, Jan. 25.—As usual, there will be a number of outside exhibitions at Chicago during the national show. Some have secured space in several of the big loop hotels, but in the main these private shows are to be held in local agencies, which are being decorated for the occasion. In the La Salle hotel there will be displays made by the Cunningham, Ideal electric, Paige-Detroit, and Warren-Detroit, while the Palmer & Singer will hold forth in the Auditorium as in former years. The Abbott-Detroit will be shown at the Centaur Motor Co., at 1725 Michigan avenue; the Grout at the Garfield Park Auto Co., 1407 Michigan avenue; the Havers at 1346 Michigan avenue; the McFarlan at C. A. Coey & Co.'s, 1424 Michigan avenue, where moving pictures of the Elgin road races will be a feature; the Oakland at 2019 Michigan avenue; the Paterson at 1420 Michigan avenue; the Ford at 1444 Michigan avenue; the Whiting at 1420 Michigan avenue; the Cutting at 1223 Michigan avenue; the Imperial at 1407 Michigan avenue, and the Empire at 2025 Michigan avenue.

PROPOSE NEW ROAD LAWS

Lincoln, Neb., Jan. 23—A set of road laws recommended by the Seward Commercial Club were introduced into the legislature last week. One of these provides for the appointment of highway commissioners in each county, to be appointed by the county boards, for the purpose of systematizing the road work. The boards are authorized, in another bill, to contract for having roads dragged, the cost not to exceed $1 a mile for each time the road is dragged. It is made unlawful to deposit weeds or rubbish on roads dragged, and unlawful to drive over them until they are dried or partly frozen. Wherever possible driving is to be done at one side until the road is in condition. County boards are authorized to a 1 mill levy for building permanent roads or making experimental roads.

Another bill taxes the cost of maintenance of roads against the abutting property owners on the following basis: 10 cents an acre if the value of the land is $50 to $100 an acre; 15 cents if the value is $100 to $125.

Motor Specifications of Pleasure Cars Made by Independent Manufacturers for the 1911 Season

Table No.	NAME OF CAR	CHASSIS MODEL	No. of Cylinders	Bore	Stroke	H. P. A. L. A. M.	Cyl. Vol.	Cyl. Type	Cyl. How Cast	Valve Location	COOLING			IGNITION					CARBURETER		Motor Lubrication
											Type	Circulation	Radiator	Type	System	Magneto	Current Source	Control	Design	Gasoline Feed	
1	Abbott-Detroit	B	4	4	4½	25.6	226.2	H	Pairs	H. & S	W	P	C	H.-T.	Dual	Bosch	M & B	Hand	Mayer	G	C
2	Adams	C	4	3⅞	5	24.0	235.8	L	Bloc	L. Side	"	"	T	"	"	Eisemann	Mag	"	Own	"	"
3	Adams-Farwell	9*	5	5½	5	60.5	594.0	H	Sep	Head	A	.....	.....	"	"	Splitdorf	M & B	"	"	"	M
4	Alpena	A	4	4	4½	25.6	226.2	L	Pairs	L. Side	W	P	T	"	"	"	M & C	"	Schebler	"	C
5	Ar Benz	30-40	4	4½	5½	27.3	280.6	"	"	Side	"	"	C	"	Doub.	.....	M & B	"	"	"	"
6	Auburn	L	4	4	4	25.6	201.1	"	Sep	L. Side	"	"	T	"	Dual	Remy	M & C	"	"	"	"
7	Auburn	Y	4	4½	5	32.4	318.1	"	"	"	"	"	"	"	"	"	"	"	"	"	"
8	Austin	45	6	4⅜	5¼	45.9	573.6	"	Pairs	Side	"	"	"	"	Doub.	.....	"	"	Carter	"	"
9	Austin	50	6	4½	6	48.6	588.6	T	Sep	Opp	"	"	"	"	"	.....	"	"	"	"	"
10	Austin	60	6	5½	5½	72.6	784.1	L	"	H & S	"	"	"	"	"	.....	"	"	"	"	"
11	Babcock	F	4	4½	5	32.4	318.1	"	Pairs	R. Side	"	"	C	"	Dual	Bosch	M & B	"	Stromberg	"	"
12	Badger	B	4	4	4	25.6	201.1	"	"	Side	"	T	T	"	"	"	"	"	Schebler	"	"
13	Badger	C	4	4	4	25.6	201.1	"	"	"	"	"	"	"	"	"	"	"	"	"	"
14	Badger	D	4	4	4	25.6	201.1	"	"	L. Side	"	"	"	"	"	.....	"	"	Rayfield	"	"
15	Belden	A	6	5	6	60	706.8	.....	"	H & S	"	P	C	"	Doub	Bosch	"	Gov	Own	P	"
16	Belden	B	6	4½	6	48.6	572.6	.....	"	"	"	"	"	"	"	"	2 Mag.	"	"	"	"
17	Bergdoll	C	4	4	4½	25.6	226.2	.....	Bloc	"	"	"	"	"	Dual	"	M & B	Fixed	Mayer	G	"
18	Bergdoll	Roadster	4	4	4½	25.6	226.2	.....	"	"	"	"	"	"	"	"	M & C	"	"	P	"
19	Berkshire	E	4	4 11/16	5½	35.1	379.6	.....	Sep	Opp	"	"	"	"	"	"	Mag	Hand	Schebler	G	"
20	Black Crow	10-11-12	4	4	4½	25.6	226.2	L	Bloc	L. Side	"	T	"	"	"	Remy	"	"	"	"	"
21	Black Crow	13	4	4½	4½	27.3	253.9	"	Pairs	"	"	"	"	"	"	"	"	"	"	"	"
22	Black Crow	15	4	4½	4½	30.6	270.6	"	"	"	"	"	"	"	"	"	"	"	"	"	"
23	Black Crow	17-20	4	4½	5	30.6	300.7	"	"	"	"	"	"	"	"	Splitdorf	"	"	"	"	"
24	Cameron	15	4	3½	3½	24.0	165.1	"	Sep	Side	A	.....	.....	"	Doub	.....	"	"	Planhard	"	"
25	Cameron	16	4	3½	3½	24.0	165.1	"	"	"	"	.....	.....	"	"	.....	"	"	"	"	"
26	Cameron	.....	4	3⅞	3⅜	24.0	176.9	H	"	Opp	"	.....	.....	"	Dual	Heinze	M & C	"	Optional	"	"
27	Cameron	.....	4	3⅞	3⅜	24.0	176.9	"	"	"	"	.....	.....	"	"	"	"	"	"	"	"
28	Cameron	.....	6	3⅛	3⅜	36.1	249.7	L	"	Side	"	.....	.....	"	Doub	.....	Mag	"	Planhard	"	"
29	Cameron	.....	6	3⅛	3⅜	36.1	249.7	"	"	"	"	.....	.....	"	"	.....	"	"	"	"	"
30	Carhartt	B-C-D-E	4	4¼	4½	28.9	255.3	"	Pairs	R. Side	W	P	C	"	Dual	Bosch	M & B	"	Stromberg	"	"
31	Carhartt	J	4	4	4	25.6	201.1	"	"	L. Side	"	"	T	"	"	Remy	M & C	"	Schebler	"	"
32	Cavalier	C	4	4	4	25.6	201.1	"	Sep.	Side	"	"	"	"	"	Splitdorf	"	"	"	"	"
33	Cino	.....	4	4½	5	30.6	300.7	H	Pairs	Head	"	"	"	"	"	.....	"	"	Stromberg	P	"
34	Clark	A & B	4	4	4	25.6	201.1	L	Sep.	L.Side	"	"	"	"	"	Remy	"	"	Schebler	G	"
35	Colburn	N	4	4½	6	28.9	340.4	.....	Pairs	H & S	"	T	"	"	Doub.	Bosch	M & B	Fixed	Stromberg	P	"
36	Colby	H	4	4½	5½	27.3	280.6	L	"	L. Side	"	P	"	"	Dual	"	M & C	Hand	"	G	"
37	Cole	30	4	4½	4½	28.9	255.3	"	"	"	"	"	"	"	"	Remy	M & B	"	Schebler	"	"
38	Cole	Flyer	4	4	4	25.6	201.1	"	"	"	"	"	"	"	"	"	"	"	"	"	"
39	Continental	.....	4	4½	4½	30.6	270.6	"	Bloc	Side	"	T	"	"	"	.....	"	"	"	"	"
40	Correja	35	4	4¼	5	28.9	283.6	T	Pairs	Opp	"	P	C	"	Sing	Simms	Mag	Fixed	"	"	"
41	Correja	40	4	4½	5	28.9	283.6	"	"	"	"	"	"	"	"	"	"	"	"	"	"
42	Crawford	30	4	4½	4½	28.9	255.3	L	"	R. Side	"	"	T	"	Dual	Remy	"	Hand	.....	"	"
43	Crawford	35	4	4½	4½	32.4	286.3	"	"	"	"	"	"	"	"	"	"	"	Stromberg	"	"
44	Cunningham	H	4	4½	5½	36.1	407.6	H	"	Head	"	"	"	"	"	Bosch	M & B	"	"	"	"
45	Cutting	A-30	4	3¾	5	22.5	220.9	L	Bloc	Side	"	T	"	"	"	Remy	Mag	"	Schebler	"	"
46	Cutting	B-40	4	4⅜	4½	30.7	270.6	"	Pairs	"	"	P	"	"	"	"	"	"	"	"	"
47	Cutting	50	4	4½	5	28.9	283.6	.....	Sep	H & S	"	"	"	"	"	"	"	"	"	"	"
48	Cutting	60	4	4½	5½	36.1	389.9	T	Pairs	Opp	"	"	"	"	Doub	"	M & B	"	Stromberg	"	"
49	Dearborn	H	4	4	5	25.6	251.3	H	"	Head	"	"	"	"	Dual	"	M & C	"	Schebler	"	"
50	De Tamble	G-H-J	4	4½	4½	28.9	286.3	L	"	L. Side	"	"	"	"	"	"	"	"	"	"	"
51	Derain	O-4	4	5	5½	.....	431.9	*	"	.....	"	"	C	"	Doub	Opt	M & AK	"	Own	"	"
52	Diamond	I	4	4½	5	32.4	327.0	L	Sep	L. Side	"	"	"	"	Dual	Remy	M & B	"	Schebler	"	"
53	Diamond-T	.....	4	5	5	40.0	392.7	"	Pairs	"	"	"	"	"	"	Bosch	"	"	.....	"	"
54	Empire	C	4	3½	4	19.6	153.9	T	Bloc	Opp	"	T	T	"	Opt	Eisemann	Mag	"	Schebler	"	"
55	Enger	40	4	4⅜	5	34.3	336.0	L	Pairs	L. Side	"	P	C	"	Dual	"	M & C	"	"	"	"
56	Falcar	N	4	4⅛	5½	27.3	280.6	"	"	"	"	"	T	"	"	Bosch	M & B	"	Optional	"	"
57	Firestone-Columbus	74-C	4	4	4	25.6	201.1	"	"	Side	"	"	"	"	"	Splitdorf	M & C	"	Schebler	"	"
58	Firestone-Columbus	86-C	4	4½	4½	28.9	255.3	"	"	"	"	"	C	"	"	Remy	"	"	"	"	"
59	Firestone-Columbus	66-C	4	4½	5	32.4	327.0	"	"	"	"	"	T	"	Doub	Mea	"	"	Stromberg	P	"
60	Ford	T	4	3¾	4	22.5	176.7	"	Bloc	"	"	"	"	"	Sing	Own	Mag	"	Optional	G	F
61	Frontenac	C	4	4½	5	36.1	354.4	"	Pairs	L Side	"	"	"	"	Dual	.....	M & B	"	Stromberg	"	C
62	Fuller	A	4	4½	5	32.4	327.0	"	Sep	"	"	"	C	"	"	Remy	M & C	"	Schebler	"	"
63	Fuller	A-Spec	4	4½	5	36.1	354.4	"	"	"	"	"	"	"	"	"	"	"	"	"	"
64	Gaeth	21	4	4¼	6	38.0	448.0	T	Pairs	Opp	"	T	"	L.-T.	Ma. & Brk.	.....	M & B	"	Own	"	"
65	Gaylord	U	4	4	5	25.6	251.3	H	"	Head	"	P	T	H.-T.	Dual	Remy	Mag.	"	.....	"	"

ABREVIATIONS:— Cylinder Type: T, T-Head; L, L-Head; H, Valves-in-Head; *2-cycle motor. **Cylinders How Cast:** Sep., Separately; Pairs, in Pairs; Bloc, en Bloc. **Valve Location:** R. Side, Right Side; L. Side, Left Side; Opp., on Opposite Sides; H & S, Head and Side; **Cooling Type:** A, Air-Cooled; W, Water-Cooled. **Radiator:** C, Cellular or Honeycomb; T, Tubular. **Ignition:** H.-T., High-Tension; L.-T., Low-Tension; Ma-&-Brk., Make-and-Break. **Current Source:** M, or Mag., Magneto; B, or Bat., Storage Battery. C, or Dry C., Dry Cells. **Gasoline Feed:** P, Pressure Feed; G, Gravity Feed. **Motor Lubrication:** C, Circulating System; M, Mechanical Oiler; F, Fly-Wheel Circulating System; G, Gravity System; O, Oil Fed with Fuel.

Transmission and Running Gear Specifications of Independent Pleasure Cars for the 1911 Season

Table No.	NAME OF CAR	CHASSIS MODEL	TRANSMISSION							BRAKES		RUNNING GEAR							BEARINGS									
			CLUTCH		GEARSET			Drive	Car Drives Thru	Rear Axle									Crankshaft		Camshaft		Gearset	Front Wheel	Rear Axle	Clutch Sp'dle	Clutch Thrust	Str'ng Knu'le	Str'ng Gears
			Type	Friction Surface	Type	No. Spds	Loc.				Service	Em.	Wheel Base	Front Tires	Rear Tires	Front Sp'gs	Rear Springs	Front Axle	Type	No.	Type	No.							
1	Abbott-Detroit	B	M. D.	S	Sel.	3	Amid.	S	T	Float.	Trans.	Int.	110	34x3½	34x3½	½ El.	¾ El	I	Plain	3	Plain	4	Ball	Roll.	Ball	Ball	Ball	Roll.	Plain
2	Adams	C	Cone	R	"	3	"	"	T R	"	Ext.	"	118	34x	34x	"	"	"	"	3	"	3	"	"	Roll.	Plain	...	...	...
3	Adams-Farwell	9	"	B & I	"	3	U. M.	C	S	Semi-F.	Int.	Ext.	128	36x4½	36x4½	"	½ El.	R	"	3	..	..	"	"	"	Ball	Plain	Plain	B&P
4	Alpena	A	M. D.	S	"	3	"	S	R	Float.	Ext.	Int.	112	34x3½	34x3½	"	¼ Plat.	I	"	3	Plain	3	"	Ball	Ball	Plain	Ball	"	Plain
5	Ar Benz	30–40	Cone	L	"	3	....	"	..	.....	R. W.	R.W.	120	36x	36x	"	¾ El.	"	"	3	..	..	"	"	B & R	"	"	Ball	Ball
6	Auburn	L	"	L & I	"	3	Amid.	"	R	Float.	.....	Int.	112	34x3½	34x3½	"	"	T	"	5	Plain	3	"	"	"	"	"	Plain	Plain
7	Auburn	Y	"	"	"	3	"	"	"	"	.....	"	120	36x3½	36x3½	"	"	I	"	5	"	3	"	"	Roll.	"	"	"	"
8	Austin	45	M. D.	S	"	3	"	"	"	"	.....	..	126	x4	x4	"	El.	"	"	4	"	4	"	"	Ball	"	"	"	"
9	Austin	50	"	"	"	3	"	"	"	"	.....	..	135	36x4½	36x4½	"	"	"	"	7	"	4	"	"	"	"	"	"	"
10	Austin	60	"	"	"	4	"	"	"	"	.....	..	147	36x4½	37x5	"	"	"	"	7	"	4	"	"	"	"	"	"	"
11	Babcock	F	"	S & B	"	3	"	"	S	"	Int.	Int.	120	36x4½	36x4½	"	¾ El.	"	"	3	"	3	Roll.	"	"	Ball	"	Ball	Ball
12	Badger	B	Cone	L	"	3	U. M.	"	"	Semi-F.	.....	..	110	34x3½	34x3½	"	"	"	"	3	"	3	B & P	"	B & R	"	"	Plain	Plain
13	Badger	C	"	"	"	3	"	"	"	"	.....	..	110	34x3½	34x3½	"	"	"	"	3	"	3	"	"	Roll	"	"	"	"
14	Badger	D	"	"	"	3	"	"	"	Float.	Int.	Int.	112	34x3½	34x3½	"	"	C	"	3	"	3	"	"	B & R	"	"	"	"
15	Belden	A	Exp. B.	R	"	4	Amid	"	T	"	Ext.	"	136	40x4½	41x5	"	"	I	"	5	Ball	5	Ball	Roll.	Ball	"	"	Ball	Ball
16	Belden	B	"	"	"	4	"	"	"	"	"	"	132	36x4½	37x5	"	"	"	"	5	"	5	"	"	"	"	"	"	"
17	Bergdoll	C	M. D.	S & R	"	3	U. M.	"	S	"	Trans.	R.A.	115	34x3½	34x3½	"	"	"	Ball	2	"	4	"	Ball	"	"	Plain	Plain	Plain
18	Bergdoll	Roadster	"	"	"	3	"	"	"	"	"	"	115	34x3½	34x3½	"	"	"	"	2	"	4	"	"	"	"	"	"	"
19	Berkshire	E	"	S	"	3	Amid.	"	R	"	Int.	Int.	118	36x4	36x4½	"	"	"	Plain	5	Plain	3	"	"	"	"	Ball	"	"
20	Black Crow	10–11–12	"	"	"	3	R. A.	"	T&R	Semi-F.	Ext.	"	109	32x3½	32x3½	"	El.	T	"	2	"	3	Roll.	"	Roll.	Plain	"	"	"
21	Black Crow	13	"	"	"	3	"	"	"	"	"	"	110	32x3½	32x3½	"	"	I	"	3	"	3	"	"	"	"	"	"	"
22	Black Crow	15	"	"	"	3	"	"	"	"	"	"	112	39x3½	34x3½	"	"	C	"	3	"	3	"	"	"	"	"	"	"
23	Black Crow	17–20	"	"	"	3	"	"	"	"	"	"	120	34x4	34x4	"	"	"	"	3	"	3	Ball	"	Ball	"	"	"	"
24	Cameron	15	Cone	L & I	....	3	"	"	T	"	I & E	"	100	32x3	32x3	"	"	T	"	3	"	3	"	"	"	"	"	"	"
25	Cameron	16	"	"	....	3	"	"	"	"	"	"	104	30x3½	30x3½	"	"	"	"	3	"	3	"	"	"	"	"	"	"
26	Cameron	.....	"	"	Sel.	3	"	"	"	"	Ext.	"	100	Opt.	Opt.	"	"	"	"	3	"	3	"	"	"	"	"	"	"
27	Cameron	.....	"	"	"	3	"	"	"	"	"	"	104	"	"	"	"	"	"	3	"	3	"	"	"	"	"	"	"
28	Cameron	.....	"	"	....	3	"	"	"	"	I & E	"	106	32x3	32x3	"	"	"	"	3	"	3	"	"	"	"	"	"	"
29	Cameron	.....	"	"	....	3	"	"	"	"	"	"	114	30x3½	30x3½	"	"	"	"	3	"	3	"	"	"	"	"	"	"
30	Carhartt	B-C-D-E	M .D.	S & B	Sel.	3	Amid.	"	S	Float.	Ext.	"	118	34x4	34x4	"	¾ El.	I	"	3	"	3	"	Roll.	Roll.	"	"	"	B&P
31	Carhartt	G	Cone	L	"	3	U. M.	"	"	Semi-F.	"	"	108	32x3½	32x3½	"	"	"	"	3	"	3	"	Ball	"	"	"	"	"
32	Cavalier	C	"	L & I	"	3	R A	"	T&R	"	"	"	110	32x3½	32x3½	"	El	"	"	5	"	3	"	"	"	"	"	"	Ball
33	Cino	.....	"	L	"	3	Amid	"	T R	Float	"	"	113	34x4	34x4	"	¾ El	"	"	3	"	3	"	Roll	"	"	"	"	B&P
34	Clark	A-B	"	"	"	3	R A	"	"	Semi-F	"	"	114	34x3½	34x3½	"	El	"	"	5	Roll	3	Roll	Ball	"	"	"	"	Plain
35	Colburn	N	M D	S	"	4	Amid	"	T S	Float	Trans	"	120	36x4	36x4	"	¾ El	"	Ball	3	Ball	3	Ball	"	Ball	Ball	"	Ball	Ball
36	Colby	H	"	"	"	3	"	"	T	"	Int	"	121	36x4	36x4	"	"	C	Plain	3	Plain	3	"	"	"	"	"	Plain	"
37	Cole	30	Cone	L & S	"	3	U M	"	S	"	Ext	"	118	34x4	34x4	"	"	I	"	3	"	3	Plain	"	Roll	Plain	Plain	Ball	Plain
38	Cole	Flyer	"	"	"	3	"	"	"	Semi-F	"	"	108	34x3½	34x3½	"	El	"	"	3	"	3	"	"	"	"	"	"	"
39	Continental	.....	M D	S	"	3	R A	"	T	"	Int	..	116	34x3½	34x3½	"	"	"	"	3	"	3	Ball	Roll	"	"	Ball	Plain	"
40	Correja	35	Cone	L & I	"	3	"	"	"	"	Ext	Int	105	34x3½	34x3½	"	¾ El	"	"	3	"	3	Roll	"	"	"	"	"	"
41	Correja	40	"	"	"	3	"	"	"	"	"	"	125	34x4	34x4	"	"	"	"	3	"	3	"	"	"	"	"	"	"
42	Crawford	30	"	"	"	3	"	"	"	Float	"	"	112	32x3½	32x3½	"	El	T	"	3	"	3	Ball	Ball	"	"	Plain	"	"
43	Crawford	35	"	"	"	3	"	"	"	"	"	"	118	34x3½	34x3½	"	"	"	"	3	"	3	"	"	"	"	"	"	"
44	Cunningham	H	"	"	"	3	U M	"	T S	"	"	"	124	4½	4½	"	¾ El	I	"	3	"	3	"	Roll	"	Roll	Ball	"	"
45	Cutting	A-30	M D	B & S	"	3	Amid	"	T	Semi-F	R W	R W	116	32x3½	32x3½	"	"	"	"	3	"	3	Plain	Ball	"	Plain	"	"	"
46	Cutting	B-40	"	"	"	3	"	"	"	"	"	"	116	34x3½	34x3½	"	"	"	"	3	"	3	"	"	"	"	"	"	"
47	Cutting	50	"	"	"	3	"	"	"	"	"	"	116	36x3½	36x3½	"	"	"	"	5	"	3	"	"	"	"	"	"	"
48	Cutting	60	"	S	"	4	"	"	T R	Float	"	"	122	36x4	36x4	"	"	"	"	3	"	3	Ball	"	Ball	"	"	"	"
49	Dearborn	H	"	"	"	3	U M	"	T	Semi-F	"	"	112	32x4	32x4	"	"	"	"	3	"	3	B & R	"	"	"	"	"	Ball
50	De Tamble	G H & J	"	"	"	3	"	"	S	"	Ext	Int	115	34x3½	34x3½	"	"	"	"	3	"	3	Ball	"	"	"	Plain	"	"
51	Derain	O-4	D S	A & S	"	4	"	"	T	Float	"	"	125½	36x4	36x5	"	"	"	"	5	..	..	"	Ball	"	Ball	Ball	"	B&P
52	Diamond	I	M D	S	"	3	R A	"	"	Semi-F	R W	"	116	36x4	36x4	"	½ El	"	"	5	Plain	4	Roll	"	B & R	Plain	"	"	Plain
53	Diamond-T	.....	"	"	"	3	Amid	"	S	Float	Ext	"	126	36x4½	36x4½	"	¾ El	"	"	3	"	3	Ball	Roll	Roll	"	"	Ball	"
54	Empire	C	Cone	L & I	"	3	R A	"	T	Semi-F	R W	R W	96	32x3½	32x3½	"	"	TorI	"	2	"	2	"	Ball	B&R	"	"	Plain	"
55	Enger	40	M D	S	"	3	Amid	"	"	"	Ext	Int	116	34x4	34x4	"	½ El	I	"	3	"	3	"	"	Ball	Ball	"	"	Ball
56	Falcar	N	Cone	R & I	"	3	"	"	R	"	Int	"	116	34x4	34x4	"	¾ El	"	"	3	"	3	"	"	"	Plain	"	Ball	"
57	Firestone-Columbus	74C	"	L & I	"	3	"	"	T	"	Ext	"	106	32x3½	32x3½	"	"	"	"	3	B&P	3	"	Roll	"	"	"	Plain	"
58	Firestone-Columbus	86C	"	"	"	3	"	"	T R	Float	Int	"	112	34x3½	34x3½	"	"	"	"	3	Plain	3	"	Ball	"	"	"	Ball	"
59	Firestone-Columbus	66C	"	"	"	3	"	"	T	"	Ext	"	120	34x4	34x4½	"	Plat	"	"	3	"	4	"	"	"	"	"	Plain	"
60	Ford	T	M D	S	Plan	2	U M	"	T R	Semi-F	"	"	100	30x3	30x3½	"	½ El	"	"	3	"	3	Plain	"	Roll	"	Plain	"	Plain
61	Frontenac	C	Cone	L & I	Sel	3	Amid	"	T&R	"	"	"	124	34x4	34x4½	"	"	"	"	3	"	3	Ball	"	Ball	"	Ball	"	"
62	Fuller	A	M D	S	Opt	..	"	"	T	"	"	"	115	Opt	Opt	½ El	El	Opt	"	5	"	3	Roll	Roll	B&R	Roll	"	"	Ball
63	Fuller	A-Spec	"	"	"	..	"	"	"	"	"	"	120	33x4	33x4	"	"	"	"	5	"	3	"	"	"	"	Roll	"	"
64	Gaeth	.....	Con B	R&I	Sel	3	"	"	T R&S	"	"	"	120	36x4	36x4½	½ El	½ El	I	"	3	"	3	Ball	Ball	Ball	Plain	Plain	Ball	Plain
65	Gaylord	U	M D	S	"	3	R A	"	S	"	Int	Ext	112	32x3½	32x3½	"	Plat	"	"	3	"	3	Roll	"	Roll	Ball	Ball	Plain	"

ABBREVIATIONS:— Clutch Type: M. D., Multiple-Disk; Frict., Friction; Con. B, Contracting Band; Exp. B., Expanding Band; D. S., Dry Segments. **Clutch Surface:** L., Leather; S; Steel; I, Iron; B, Bronze; F, Fabric; R, Raybestos; T, Thermoid; A, Asbestos; C, Cork. **Gearset Type:** Sel., Selective; Plan., Planetary; Prog., Progressive; Frict., Friction. **Gearset Location:** Amid., Amidships; U. M., In Unit with Motor; R. A., On Rear Axle; **Drive:** S, Shaft; C, Chain. **Car Drives Through:** T, Torsion Tube; T R, Torsion Rod; R, Radius Rods; S, Springs. **Rear Axle:** Float., Floating; Semi-F., Semi-Floating. **Brakes:** Em, Emergency; E. or Ext., External Contracting; I or Int., Internal Expanding R. W., On Rear Wheels; J. S., On Jack Shaft; Trans., On Transmission; R. A., On Rear Axle. **Springs:** El., Elliptic; Plat., Platform. **Front Axle:** I, I-Beam; C, Channel; T, Tubular; R, Rectangular; *Hollow Rectangular Pressed Steel. **Bearings:** B, Ball; P, Plain, R or Roll., Roller

Motor Specifications of Pleasure Cars Made by Independent Manufacturers for the 1911 Season

Table No.	NAME OF CAR	CHASSIS MODEL	No. of Cylinders	Bore	Stroke	H. P. A. L. A. M.	Cyl. Vol.	Cyl. Type	Cyl. How Cast	Valve Location	COOLING			IGNITION					CARBURETER		Motor Lubrication
											Type	Circulation	Radiator	Type	System	Magneto	Current Source	Control	Design	Gasoline Feed	
66	Gaylord	S	4	4	5	25.6	251.3	H	Pairs	Head	W	P	T	H-T	Dual	Remy	Mag	Hand	.....	G	C
67	G. J. G.	.....	4	4½	5	36.1	354.4	L	"	L. Side	"	"	C T	"	"	Bosch	M & C	"	Own	G	M
68	Gleason	10-20	2	4½	4	18.0	141.8	.....	Sep.	.....	"	T	C T	"	"	Remy	"	"	Schebler	G	C
69	Great Southern	50	4	5½	6	42.0	495.1	L	Pairs	R. Side	"	P	C T	"	"	Bosch	.....	"	Stromberg	"	
70	Great Southern	S-O-R	4	5½	6	44.1	519.5	"	"	"	"	"	T	"	"	"	M & C	"	"	"	
71	Great Western	40	4	4½	5	28.9	283.6	.....	Sep.	H & S	"	"	"	"	"	Remy	"	"	Schebler	"	"
72	Grout	35	4	4½	5	32.4	327.0	L	"	L. Side	"	"	"	"	"	Bosch	"	"	"	"	"
73	Grout	45	4	4½	5	36.1	354.4	"	"	"	"	"	C T	"	"	Optional	"	"	"	"	"
74	Halladay	G	4	4	4	25.6	201.1	"	"	"	"	"	"	"	Doub.	Bosch	"	"	"	"	"
75	Halladay	J	4	4	4	25.6	201.1	"	"	"	"	"	"	"	"	"	"	"	"	"	"
76	Halladay	40	4	4½	5	32.4	327.0	"	"	"	"	"	C	"	"	"	"	"	"	P	"
77	Halladay	50	4	4½	5	36.1	354.4	"	"	"	"	"	"	"	"	"	"	"	"	"	"
78	Havers	6	6	3⅜	3½	27.4	201.3	"	Pairs	Side	"	T	"	"	Sing.	"	Mag.	"	"	G	"
79	Henry	40	4	4½	5½	27.3	280.6	"	"	R. Side	"	P	T	"	Dual	Splitdorf	M & C	"	Excelsior	"	"
80	Henry Roadst'r	24	4	3¾	4½	22.5	198.8	"	Bloc	"	"	T	"	"	Sing.	U & H	Mag.	"	Schebler	"	"
81	Herreshoff	20-A	4	3⅜	3¼	18.3	134.2	"	Pairs	L. Side	"	"	"	"	Doub.	Bosch	M & B	Fixed	Own	"	"
82	Herreshoff	20-B	4	3⅜	3¼	18.3	134.2	"	"	"	"	"	"	"	"	"	"	"	"	"	"
83	Herreshoff	25	4	3⅜	3½	18.3	134.2	"	Bloc	"	"	"	"	"	Sing.	"	Mag.	"	"	"	"
84	Imperial	30	4	4½	4½	.....	.....	"	Pairs	Side	"	"	"	"	Doub.	Remy	M & C	Hand	Optional	"	"
85	Imperial	35-36	4	4 1/16	4½	29.8	262.9	"	"	"	"	"	"	"	Dual	"	"	"	.....	"	"
86	Imperial	42-3-4	4	4 5/16	4½	29.8	262.9	"	"	"	"	"	"	"	Doub.	"	"	"	"	"	F
87	Imperial	50-51	4	4½	5½	36.1	372.1	"	"	"	"	"	"	"	"	"	"	"	"	"	C
88	Jenkins	1911	4	4½	5½	36.1	389.9	T	Sep.	Opp.	"	P	"	"	"	.....	M & B	"	Own	"	"
89	Johnson	30	4	4½	4½	28.9	255.3	L	Pairs	Side	"	"	C	"	Sing.	Bosch	Mag.	"	Stromberg	"	"
90	Johnson	40	4	4½	5¼	32.4	334.0	"	"	"	"	"	"	"	"	"	"	"	"	"	"
91	Johnson	50	4	5	5½	40.0	431.9	"	"	"	"	"	"	"	"	"	"	"	"	"	"
92	Jonz	Runabout	2	4½	4½	.....	120.6	*	Sep.	L. Side	A	.....	.....	"	Dual	"	"	"	Optional	"	M
93	Jonz	Roadster	3	4¼	4¼	.....	180.9	*	"	"	"	.....	.....	"	"	"	"	"	"	P	"
94	Kenmore	A	2	4	4	12.8	100.6	.....	"	.....	Opt.	T	T	"	Sing.	.....	Dry C	"	Schebler	G	"
95	Kenmore	C	2	4½	4	16.2	127.3	.....	"	Side	"	"	"	"	"	.....	"	"	"	"	"
96	Klinekar	4-24	4	3¾	4¼	22.5	187.7	L	"	R. Side	W	P	"	"	Doub	.....	M & C	"	"	"	C
97	Klinekar	4-30	4	4	4½	25.6	232.5	"	"	"	"	"	"	"	"	.....	"	"	"	"	"
98	Klinekar	4-40	4	4½	5½	27.3	297.8	T	Pairs	Opp	"	"	"	"	"	.....	"	"	Stromberg	"	"
99	Klinekar	6-50	6	4 3/32	5	40.2	394.5	"	Sep	"	"	"	"	"	"	.....	"	"	"	"	"
100	Klinekar	6-60	6	4½	5¼	43.8	446.7	"	Pairs	"	"	"	"	"	"	.....	"	"	"	"	"
101	Koehler	A	4	4½	5	28.9	283.6	H	Sep	H & S	"	"	"	"	Dual	Splitdorf	M & B	"	Schebler	"	"
102	Komet	R	4	4½	5	28.9	283.6	T	Pairs	Opp	"	"	C	"	"	Imported	M & C	"	"	"	"
103	Krit	.....	4	3½	4	16.9	132.7	L	Bloc	R. Side	"	T	T C	"	Sing	Bosch	Mag	Fixed	Stromberg	"	F
104	Leader	R-35	4	4½	4½	28.9	255.3	"	Pairs	L. Side	"	P	C	"	Dual	Remy	M & C	Hand	Schebler	"	C
105	Lexington	A	4	4¾	5	36.1	354.4	"	Sep	"	"	"	T	"	Doub	Bosch	M & B	"	"	"	"
106	Lexington	D	4	4½	5	32.4	318.1	"	"	"	"	"	"	"	"	"	M & C	"	"	"	"
107	Lexington	F	4	4½	5	32.4	318.1	"	"	"	"	"	"	"	"	"	"	"	"	"	"
108	Lion	.....	4	4½	5	32.4	318.1	H	Pairs	H & S	"	"	"	"	Dual	.....	M & B	"	Stromberg	"	"
109	Luverne	530	4	4	4	25.6	201.1	L	Sep	Side	"	"	"	"	Doub	Bosch	M & C	"	Schebler	P	"
110	Luverne	740	4	4½	5	32.4	318.1	"	"	"	"	"	"	"	"	"	"	"	"	"	"
111	McFarlan	6	6	3⅝	4	31.6	247.7	H	Pairs	Head	"	"	"	"	Dual	Splitdorf	Mag	"	Stromberg	"	"
112	McFarlan	6	6	4	5	38.4	377.0	"	"	"	"	"	C	"	"	Bosch	"	"	"	"	F
113	Marathon	M	4	4½	4½	28.9	255.3	L	"	R. Side	"	T	T	"	"	Remy	M & C	"	Schebler	G	"
114	Marathon	M	4	4½	4½	28.9	255.3	"	"	"	"	"	"	"	"	"	"	"	"	"	"
115	Maytag	2-cyl	2	5 1/16	5	20.4	201.3	H	Sep	Head	"	P	"	"	"	Splitdorf	"	"	"	"	M
116	Maytag	30	4	4	4½	25.6	226.2	L	Bloc	Side	"	T	C	"	Sing	Bosch	Mag	"	"	"	C
117	Maytag	35	4	4½	5½	28.9	290.7	"	"	"	"	"	"	"	Dual	"	M & C	"	"	"	"
118	Metz	1911	2	3.3	3½	9.0	60.3	"	Sep	"	A	.....	.....	"	Sing	"	Mag	Fixed	Own	"	"
119	Michigan	C	6	4½	5	43.8	477.2	T	Pairs	Opp	W	P	T	"	Dual	"	"	"	Schebler	"	"
120	Midland	K	4	4½	5½	36.1	389.9	L	"	R. Side	"	"	"	.....	.....	.....	.....	.....	.....	.....	
121	Midland	L	4	4½	5	32.4	318.1	T	"	Opp	"	"	.....	.....	.....	.....	.....	.....	.....	"	"
122	Morse	D	4	4¼	5	34.3	336.0	H	Sep	Head	"	"	C	H-T	Dual	Eiseman	M & C	Hand	Stromberg	"	"
123	Motorette	M	2	3½	3½	.....	62.2	*	"	.....	"	T	T	"	Sing	At Kent	Bat	"	Planhard	"	"
124	Nance	11	6	3½	4 1/16	31.6	251.5	H	Pairs	Head	"	P	"	"	Dual	Bosch	M & C	"	Stromberg	"	"
125	Norwalk	35	4	4	5	25.6	251.3	L	Sep	H & S	"	"	"	"	"	Remy	"	"	Schebler	P	"
126	Norwalk	45	4	4 5/32	5½	31.1	298.0	"	"	"	"	"	"	"	"	"	"	"	"	"	"
127	Only Car	A & F	1	5½	10	10.5	206.3	"	"	Side	"	T	"	"	Doub	Bosch	"	"	Own	G	M
128	Otto	Standard	4	4½	4½	28.9	255.3	"	Pairs	"	"	P	C	"	Dual	"	M & C	"	Stromberg	"	C
129	Otto	Standard	4	4½	4½	28.9	255.3	"	"	"	"	"	"	"	"	"	"	"	"	"	"
130	Owen	1911	4	4¾	6	36.1	425.3	"	"	R. Side	"	"	"	"	"	"	M & B	"	Rayfield	"	"

ABBREVIATIONS:—Cylinder Type: T, T-Head; L, L-Head; H, Valves-in-Head;*2-cycle motor. **Cylinders How Cast:** Sep., Separately; Pairs, in Pairs; Bloc, En Bloc. **Valve Location:** R. Side, Right Side; L. Side, Left Side; Opp., on Opposite Sides; H & S, Head and Side; **Cooling Type:** A, Air-Cooled; W, Water-Cooled. **Radiator;** C, Cellular or Honeycomb; T, Tubular. **Ignition:** H.-T., High-Tension; L.-T., Low-Tension; Ma.-&-Brk., Make-and-Break. **Current Source:** M, or Mag., Magneto; B, or Bat., Storage Battery, C, or Dry C., Dry Cells. **Gasoline Feed:** P, Pressure Feed; G, Gravity Feed. **Motor Lubrication:** C, Circulating System; M, Mechanical Oiler; F, Fly-Wheel Circulating System; G, Gravity System; O, Oil Fed with Fuel

Transmission and Running Gear Specifications of Independent Pleasure Cars for the 1911 Season

Table No.	NAME OF CAR	CHASSIS MODEL	TRANSMISSION								BRAKES		RUNNING GEAR						BEARINGS											
			CLUTCH		GEARSET			Drive	Car Drives Thru	Rear Axle	Service	Em.	Wheel Base	Front Tires	Rear Tires	Front Sp'gs	Rear Springs	Front Axle	Crankshaft		Camshaft		Gearset	Front Wheel	Rear Axle	Clutch Sp'dle	Clutch Thrust	Str'ng Knu'le	Str'ng Gears
			Type	Friction Surface	Type	No. Spds	Loc.												Type	No.	Type	No.								
66	Gaylord	S	M D	S	Sel.	3	R A	S	S	Semi-F.	Int	Ext	106	36x3½	36x3½	½ El	Plat	I	Plain	3	Plain	3	Roll	Ball	Roll	Ball	Ball	Plain	Plain
67	G. J. G		Cone	L&I	"	3	Amid	"	T	Float	Opt	Int	121	34x4	34x4	"	¾ El	"	"	3	"	3	Ball	"	Ball	Plain	Roll	Ball	Ball
68	Gleason		M D	S&B	"	3	"	"	R&S	"	.....	..	96	36x2	36x2	"	El	"	"	2	"	3	Plain	"	Ball	"	Ball	Plain	Plain
69	Great Southern	50	Cone	L&I	"	3	"	"	T	Semi-F	Ext	Int	128	36x4	36x4½	"	¾ El	"	"	3	"	3	Roll	Roll	Roll	"	"	"	"
70	Great Southern	50-R	"	"	"	3	"	"	"	"	"	"	124	36x4	36x4½	"	"	"	"	3	"	3	"	"	"	"	"	"	"
71	Great Western	40	"	R	"	3	"	"	S	"	Int	Ext	114	34x3½	34x3½	"	"	"	"	5	"	3	"	Ball	Ball	"	Roll	"	Ball
72	Grout	35	"	L&I	"	3	"	"	"	"	Ext	Int	116	34x4	34x4	"	Plat	"	"	5	"	3	"	Roll	Roll	"	"	"	"
73	Grout	45	"	"	"	3	"	"	R	Float	"	"	123	36x4	36x4	"	"	"	"	5	"	3	"	"	"	"	B&P	"	B&P
74	Halladay	G	"	"	"	3	R A	"	"	Semi-F	R W	R W	104	32x3½	32x3½	"	El	"	"	5	"	3	Ball	Ball	"	Ball	..	"	"
75	Halladay	J	M D	S	"	3	Amid	"	"	Float	"	"	110	34x3½	34x3½	"	"	C	"	5	"	3	"	"	Ball	Ball	..	"	"
76	Halladay	40	"	"	"	3	"	"	"	"	Int	Int	118½	36x3½	36x4	"	¾ El	"	"	5	"	3	"	"	"	Plain	Ball	"	"
77	Halladay	50	"	"	"	3	"	"	"	"	Ext	"	125	36x4½	36x4½	"	"	I	"	5	"	3	"	"	"	"	"	"	"
78	Havers	C	Cone	C&L	"	3	U M	"	S	Semi-F	Int	Ext	115	36x3½	36x3½	"	"	"	"	..	"	..	Plain	"	Roll	"	"	"	Plain
79	Henry	40	M D	S	"	3	Amid	"	R	Float	"	Int	116	34x4	34x4	"	"	C	"	3	"	3	Ball	"	Ball	"	"	"	B&P
80	Henry Roadster	24	"	"	"	3	R A	"	"	Semi-F	Ext	"	106	32x3½	32x3½	"	El	I	"	2	"	3	Roll	"	Roll	"	"	"	"
81	Herreshoff	20-A	"	"	"	3	U M	"	T	"	"	"	100	32x3½	32x3½	"	½ El	"	Ball	3	Ball	3	Ball	Roll	"	"	"	"	Plain
82	Herreshoff	20-B	"	"	"	3	"	"	"	"	"	"	105	32x3½	32x3½	"	"	"	"	3	"	3	"	"	"	"	"	"	"	"
83	Herreshoff	25	"	"	"	3	"	"	"	"	Ext T	"	98	32x3	32x3	"	"	"	Plain	2	Plain	3	Plain	Ball	B&R	"	"	"	"
84	Imperial	30	Cone	L&I	"	3	Amid	"	"	"	Int	Ext	106	32x3½	32x3½	"	El	"	"	3	"	4	B&R	"	Roll	B&R	"	"	..
85	Imperial	35-36	"	"	"	3	"	"	"	"	"	"	112	34x3½	34x3½	El	"	"	"	3	"	4	R&P	"	"	"	"	"	..
86	Imperial	42-3-4	M D	S	"	3	U M	"	"	"	"	"	115	34x3½	34x3½	½ El	¾ El	"	"	3	"	4	B&R	"	"	"	"	"	..
87	Imperial	50-51	Cone	L&I	"	3	Amid	"	"	"	"	"	117	34x4	34x4	El	El	"	"	3	"	4	"	"	"	"	"	"	..
88	Jenkins	1911	"	L	"	3	"	"	"	Float	R A	R W	118	36x4	36x4	½ El	½ El	"	"	5	"	3	Plain	Roll	"	Plain	"	Roll	Ball
89	Johnson	30	"	L&I	"	3	"	"	"	"	Int	Int	112	34x3½	34x3½	"	¾ El	T	"	3	"	4	Ball	Ball	Ball	"	"	Plain	"
90	Johnson	40	"	"	"	3	"	"	"	"	R W	R W	112	34x4	34x4	"	½ El	"	"	3	"	4	"	"	"	"	"	"	"
91	Johnson	50	"	"	"	3	"	"	"	"	Int	"	124	36x4½	36x4½	"	"	I	"	3	"	4	"	"	"	"	"	"	"
92	Jons	Runabout	M D	A	"	2	"	"	R	Semi-F	Ext	..	90	30x3	30x3	¾ El	El	"	"	3	..	..	"	"	Roll	Ball	"	Ball	"
93	Jons	Roadster	"	"	"	3	"	"	S	Float	Int	Ext	104	32x3½	32x3½	"	¾ El	"	"	4	"	..	"	"	Ball	"	Roll	"	"
94	Kenmore	A	Cone	....	Plan	2	"	"	S	Semi-F	"	Rev	82	30x	30x	½ El	El	T	"	2	Plain	2	Plain	"	B&R	Plain	Plain	Plain	Plain
95	Kenmore	C	"	....	"	2	"	"	"	"	"	"	96	32x	32x	"	"	"	"	2	"	2	"	"	"	"	"	"	"
96	Klinekar	4-24	"	L&I	Sel	3	"	"	S	"	.....	..	112	34x3½	34x3½	"	¾ El	I	"	5	"	3	Ball	"	Ball	"	"	"	"
97	Klinekar	4-30	"	"	"	3	"	"	"	"	.....	..	112	34x3½	34x3½	"	½ El	"	"	5	"	3	"	"	"	"	"	"	"
98	Klinekar	4-40	"	"	"	3	"	"	"	Float	.....	..	117	36x4	36x4	"	¾ El	"	"	5	"	3	"	"	"	"	"	"	"
99	Klinekar	6-50	"	"	"	3	"	"	"	"	.....	..	124	36x4	36x4	"	"	"	"	7	"	4	"	Roll	Roll	"	Ball	"	"
100	Klinekar	6-60	"	L & S	"	4	"	"	"	"	.....	..	128	38x4	38x4½	"	"	"	"	7	"	3	"	Ball	Ball	"	"	"	"
101	Koehler	A	"	L & I	"	3	"	"	T	Semi-F	Ext	Int.	114	34x3½	34x3½	"	"	"	"	5	"	3	Roll	"	B & R	"	Plain	"	"
102	Komet	R	M D	S	"	3	"	"	R	"	"	"	125	35x4	35x4	"	El	"	"	3	"	3	"	"	Roll	Ball	Ball	"	Ball
103	Krit	.....	"	"	"	2	U M	"	"	"	.....	..	96	32x3	32x3	"	½ El	"	Ball	2	"	3	Ball	"	B & R	Plain	"	"	Plain
104	Leader	R-35	Cone	L	"	3	Amid	"	"	"	Ext	Int.	116	34x3½	34x3½	"	El	"	Plain	3	"	3	Roll	"	Ball	Ball	Plain	"	"
105	Lexington	A	"	L & I	"	3	"	"	T	Float	"	"	122	36x4½	36x4½	"	½ El	"	"	5	"	3	Ball	Roll	Roll	Plain	Ball	"	B & P
106	Lexington	D	"	"	"	3	"	"	"	Semi-F	"	"	117	34x3½	34x3½	"	El	"	"	5	"	3	"	"	"	"	"	"	"
107	Lexington	F	"	"	"	3	"	"	"	Float.	"	"	122	34x4	34x4	"	¾ El	"	"	5	"	3	"	"	"	"	"	"	"
108	Lion	.....	"	R	"	3	U M	"	S	Semi-F	.....	..	112	36x3½	36x3½	"	"	"	"	3	"	3	Roll	Ball	"	"	"	Ball	Ball
109	Luverne	530	M D	S	"	3	Amid	"	P &R	"	Ext	Int	110	32x4	32x4	El	El	T	"	5	"	3	Ball	"	"	"	Plain	Plain	Plain
110	Luverne	740	"	"	"	3	"	"	"	"	"	"	122	36x4½	36x4½	½ El	¾ El	I	"	5	"	3	"	"	"	"	Fibre	"	"
111	McFarlan	6	"	"	"	3	U M	"	R	"	Int	Ext	120	36x3½	36x4	"	El	"	"	4	"	4	Plain	"	B & R	"	Ball	"	"
112	McFarlan	6	"	"	"	3	"	"	"	"	"	"	128	36x4	36x4	"	"	"	"	4	"	4	Ball	"	Ball	Ball	"	"	"
113	Marathon	M	"	"	"	3	"	T	"	"	Ext	Int.	116	34x3½	34x3½	"	"	"	"	3	"	3	"	"	Roll	"	"	"	"
114	Marathon	M	"	"	"	3	"	"	"	"	"	"	120	34x3½	35x4	"	"	"	"	3	"	3	"	"	"	"	"	"	"
115	Maytag	2-cyl.	Cone	S & L	Plan	2	"	C	R	Dead	Int	"	100	32x3½	32x3½	"	"	T	"	2	"	2	Plain	Roll	"	Roll	Roll	"	"
116	Maytag	30	M D	S & R	Sel	3	"	S	T	Semi-F	"	Ext	116	34x3½	34x3½	"	"	I	"	2	"	2	Ball	Ball	Ball	Ball	Ball	Ball	Ball
117	Maytag	35	"	"	"	3	"	"	"	Float	Ext	Int	118	34x4	34x4	"	¾ El	"	"	3	"	4	"	"	"	"	"	"	"
118	Mets	1911	....	....	Frict	Any	"	C	R	Dead	Disk	Rev.	81	28x3	28x3	El	El	T	"	2	"	2	..	"	"	"	"	Plain	Plain
119	Michigan	C	M D	S	Sel	3	Amid	S	T&R	Semi-F	.....	..	124	40x4	40x4	½ El	¾ El	I	"	4	"	4	Roll	"	Roll	Plain	"	"	"
120	Midland	K	"	B & S	"	3	"	"	T	Float.	Ext	Int	118	36x4	36x4	"	El	"	"	3	"	3	"	Roll	"	Roll	"	"	"
121	Midland	L	"	S & R	"	3	U M	"	"	"	Int.	"	115	34x4	34x4	"	¾ El	R*	"	3	"	3	"	Ball	Ball	"	"	"	Ball
122	Morse	D	"	S	"	4	Amid	"	"	Semi-F	"	"	127	36x4½	36x4½	"	"	I	"	5	"	5	Ball	"	"	Ball	"	B&P	B&P
123	Motorette	M	Cone	....	Plan	2	U M	C	S	Dead	"	Trans	74	28x2½	28x3	El	Spec	"	"	2	"	..	Plain	"	"	"	...	Ball	...
124	Nance	11	M D	S	Sel	3	"	S	"	Float	R A	R A	122	34x3½	34x3½	½ El	¾ El	"	"	4	Plain	4	Ball	"	B & R	B&P	Plain	B&P	B&P
125	Norwalk	35	Cone	R	"	3	Amid	"	"	"	Ext	Int	117	36x3½	34x3½	"	"	"	"	5	"	3	Roll	"	Ball	Plain	"	B&P	Plain
126	Norwalk	45	"	"	"	3	"	"	"	"	"	"	117	36x4	36x4	"	"	"	"	5	"	3	"	"	"	"	"	"	"
127	Only Car	A & F	"	L & I	"	3	R A	"	T	Semi-F	Int	"	104	29x3½	29x3½	"	½ El	C	Ball	2	Ball	2	Ball	"	"	"	"	Plain	Ball
128	Otto	Standard	"	L	"	3	"	"	"	Float	Ext	"	123	34x3½	34x4	"	¾ El	I	"	3	"	3	"	"	"	"	Ball	"	"
129	Otto	Standard	"	"	"	3	"	"	"	"	"	"	123	34x4	34x4	"	"	"	"	3	"	3	"	"	"	"	"	"	"
130	Owen	1911	"	L&I	"	3	Amid	"	S	"	"	"	120	42x4	42x4	"	"	"	Plain	3	Plain	3	Plain	Roll	Roll	Plain	"	"	"

ABBREVIATIONS:—**Clutch Type:** M. D., Multiple Disk; Frict., Friction; Con. B., Contracting Band; Exp. B., Expanding Band, D. S., Dry Segments. **Clutch Surface:** L., Leather; S, Steel; I, Iron; B, Bronze; F, Fabric; R, Raybestos; T, Thermoid; A, Asbestos; C, Cork. **Gearset Type:** Sel., Selective; Plan., Planetary; Prog., Progressive; Frict., Friction. **Gearset Location:** Amid., Amidships; U. M., In Unit with Motor; R. A., On Rear Axle; **Drive:** S, Shaft; C, Chain. **Car Drives Through:** T, Torsion Tube; T R, Torsion Rod; R, Radius Rods; S, Springs. **Rear Axle:** Float., Floating; Semi-F., Semi-Floating. **Brakes:** Em., Emergency; E. or Ext., External Contracting; I or Int., Internal Expanding; R. W., On Rear Wheels; J. S., On Jack Shaft; Trans., On Transmission; R. A., On Rear Axle. **Springs:** El., Elliptic; Plat., Platform. **Front Axle:** I, I-Beam; C, Channel; T, Tubular; R, Rectangular; *Hollow Rectangular Pressed Steel. **Bearings:** B, Ball; P, Plain; R or Roll., Roller

Motor Specifications of Pleasure Cars Made by Independent Manufacturers for the 1911 Season

Table No.	NAME OF CAR	CHASSIS MODEL	No. of Cylinders	Bore	Stroke	H. P. A. L. A. M.	Cyl. Vol.	Cyl. Type	Cyl. How Cast	Valve Location	COOLING			IGNITION					CARBURETER		Motor Lubrication
											Type	Circulation	Radiator	Type	System	Magneto	Current Source	Control	Design	Gasoline Feed	
131	Paige-Detroit	B	4	3¾	4	22.5	176.7	L	Bloc	L. Side	W	T	T	H-T	Sing.	Bosch	Mag.	Fixed	Special	G	C
132	Paige-Detroit	C	4	3¾	5	22.5	220.9	"	"	"	"	"	"	"	"	"	"	"	"	"	"
133	Parry	27	4	3½	3½	19.6	144.3	H	Pairs	Head	"	"	"	"	"	"	"	Hand	Schebler	"	"
134	Parry	37–48	4	4½	4½	28.9	255.3	"	"	"	"	P	C	"	Opt.	"	M & C	"	"	"	"
135	Parry	37–48	4	4½	4½	28.9	255.3	"	"	"	"	"	"	"	"	"	"	"	"	"	"
136	Paterson	30	4	4	4	25.6	201.1	L	"	Side	"	T	T	"	Dual	Remy	"	"	"	"	"
137	Paterson	40	4	4½	4½	28.9	255.3	"	"	"	"	P	"	"	"	"	"	"	"	"	"
138	Penn	R-T-D	4	4	4½	25.6	226.2	"	Bloc.	R. Side	"	T	"	"	"	Briggs	"	"	"	"	"
139	Pennsylvania	B	4	4½	5½	36.1	372.1	H	Pairs	Head	"	P	C	"	"	Bosch	"	"	"	P	M
140	Pennsylvania	C	4	4¼	5½	36.1	372.1	"	"	"	"	"	"	"	"	"	"	"	"	"	"
141	Pennsylvania	F	6	4½	5½	54.1	558.2	"	"	"	"	"	"	"	"	"	"	"	Miller	"	"
142	Pennsylvania	H	6	4½	5¼	54.1	558.2	"	"	"	"	"	"	"	"	"	"	"	"	"	"
143	Petrel	25-35	4	3¾	4	22.5	176.7	L	"	L. Side	"	"	T	"	"	.....	"	"	.....	G	C
144	Petrel	40	4	4⅛	4¼	30.6	285.6	"	"	"	"	"	"	"	"	.....	"	"	Stromberg	"	"
145	Petrel	45–55	4	4⅛	4¼	30.6	285.6	"	"	"	"	"	"	"	"	.....	"	"	"	"	"
146	Petrel	65–75	4	4⅜	5½	30.6	315.7	"	"	"	"	"	"	"	"	.....	"	"	"	"	"
147	Pickard	E-F-G-H	4	4	4	25.6	201.1	H	Sep.	Head	A	.....	.....	"	Doub.	Splitdorf	"	"	Breeze	"	"
148	Pickard	E-F-G-H	4	4	4	25.6	201.1	"	"	"	"	.....	.....	"	"	"	"	"	"	"	"
149	Pilot	B	4	4¼	5½	36.1	372.1	L	Pairs	Side	W	P	C	"	"	Bosch	M & B	"	Schebler	"	C
150	Pilot	S	4	4¼	4½	28.9	269.4	"	"	"	"	"	"	"	"	"	"	"	"	"	"
151	Primo	F-P	4	4	4½	25.6	226.2	"	"	"	"	"	T	"	Sing.	"	Mag.	"	"	"	"
152	Primo	L-R	4	3¾	4½	22.5	198.8	"	"	"	"	"	"	"	"	"	"	"	"	"	"
153	Rambler	63	4	4½	4½	32.4	286.3	"	Sep.	R. Side	"	"	"	"	Dual	.....	M & B	"	Stromberg	"	M
154	Rambler	64	4	5	5½	40.0	431.9	"	"	"	"	"	"	"	"	Doub.	.....	"	"	"	"
155	Rambler	64	4	5	5½	40.0	431.9	"	"	"	"	"	"	"	"	"	"	"	"	"	"
156	Rambler	65	4	5	5½	40.0	431.9	"	"	"	"	"	"	"	"	.....	"	"	"	"	"
157	Rambler	65	4	5	5½	40.0	431.9	"	"	"	"	"	"	"	"	.....	"	"	"	"	"
158	Rayfield	A	4	3	3½	14.4	99	Pairs	Opp.	"	"	T	"	"	Sing.	Bosch	Mag.	Fixed	Rayfield	"	"
159	Reading	1911	4	5	6	40.0	471.2	H	Bloc	Opp	W	P	T	"	Doub	Volta	M & B	Hand	Kingston	G	C
160	Roader	20	4	3⅞	3⅞	20.3	149.7	L	"	R Side	"	T	"	"	Sing	Bosch	Mag	Fixed	Schebler	"	"
161	Roader	30	4	4	4¼	25.6	213.6	"	"	"	"	"	"	"	"	"	"	"	"	"	"
162	Rogers	B	2	4¾	4	18.0	141.8	"	Sep	Side	A	.....	.....	"	"	"	"	Hand	.....	"	M
163	Schacht	A-A	4	4¼	5	28.9	283.6	"	Pairs	H & S	W	P	C	"	Opt	.....	Opt	"	Schebler	"	C
164	Schlosse	24–30	4	4½	5	32.4	318.1	T	Sep	Opp	"	"	"	"	Dual	Bosch	M & B	"	Mayer	P	M
165	Sibley	A	4	3¾	5	22.5	354.4	"	Bloc	"	"	T	T	"	Sing	"	Mag	"	Williams	G	"
166	Spoerer	D-A	4	4⅛	5½	27.3	280.6	L	Pairs	R Side	"	P	C	"	Dual	"	M & C	"	Own	"	C
167	Spoerer	C	4	4⅞	5½	38.0	410.6	T	"	Opp	"	"	"	"	"	"	"	"	Stromberg	P	"
168	Standard	L-N	6	4½	5	48.6	318.1	H	"	Head	"	"	T	"	"	.....	M & B	"	Own	G	"
169	Staver-Chicago	30	4	4	4	25.6	201.1	L	"	R Side	"	"	C	"	"	S S	M & C	"	"	"	"
170	Staver-Chicago	35	4	4⅜	5	30.6	300.7	T	Bloc	Opp	"	"	"	"	"	"	"	"	"	"	"
171	Staver-Chicago	40	4	4½	5	32.4	318.1	"	"	"	"	"	"	"	"	"	"	"	"	"	"
172	Staver-Chicago	40	4	4½	5	32.4	318.1	"	"	"	"	"	"	"	"	"	"	"	"	"	"
▾173	Staver-Chicago	40	4	4½	5	32.4	318.1	"	"	"	"	"	"	"	"	"	"	"	"	"	"
174	Stuyvesant	.....	6	4½	6	48.6	572.6	"	Pairs	"	"	T	T	"	.....	.....	M & B	"	.....	"	"
175	Stuyvesant	.....	4	4⅝	6	38.0	448.0	"	"	"	"	"	"	"	.....	.....	"	"	.....	"	"
176	Van	11	4	3¾	4	22.5	176.7	H	"	Head	"	"	"	"	Doub	Splitdorf	"	"	Schebler	"	M
177	Velie	G	4	4½	5½	32.4	334.0	L	"	Side	"	P	C	"	"	"	M & C	"	Optional	"	C
178	Victor	40	4	4 1/16	4½	30.0	262.9	"	"	"	"	"	T	"	Dual	Remey	"	"	Schebler	"	F
179	Virginian	A-50	4	5	5	40.0	392.7	"	"	"	"	"	"	"	"	Bosch	M & B	"	"	"	C
180	Warren-Detroit	A-50	4	4	4½	25.6	226.2	"	Bloc	R Side	"	"	"	"	Doub	"	M & C	Fixed	Holley	"	"
181	Warren-Detroit	A-50	4	4	4½	25.6	226.2	"	"	"	"	"	"	"	"	"	"	"	"	"	"
182	Washington	V-40	4	4½	5¼	27.3	280.6	"	Pairs	L Side	"	"	"	"	Dual	"	Opt	Hand	Own	"	"
183	Welsh-Detroit	S	4	5	5	40.0	392.7	T	"	Opp	"	"	"	"	"	"	M & C	"	Schebler	"	"
184	Welsh-Pontiac	4-R	4	5½	6	48.4	570.2	H	Bloc	"	"	"	C	"	Doub	Mea	M & B	"	Ranier	P	"
185	Wescott	1911	4	4¾	5	36.1	354.4	L	Sep	L Side	"	"	T	"	Dual	Remy	"	"	Schebler	G	"
186	W. F. S.	A	4	4⅛	5¼	27.3	280.6	"	Pairs	"	"	"	C	"	"	Bosch	Mag	"	Stromberg	P	"
187	Whiting	A	4	3¾	3⅝	16.9	112.0	"	"	Side	"	T	"	"	Sing	"	M & C	"	Schebler	G	"
188	Wilcox	35	4	4¼	5	28.9	283.6	"	"	"	"	P	T	"	Dual	Splitdorf	M & B	"	Wil. Ben	"	"
189	Zimmerman	E	2	4½	4	16.2	127.3	T	Sep	Opp	A	.....	.....	"	Sing	.....	Dry C	"	Schebler	"	M
190	Zimmerman	L	2	4¼	4	18.0	141.8	"	"	"	"	.....	.....	"	"	.....	"	"	"	"	"
191	Zimmerman	Z-40	4	4 1/16	5	38.9	382.9	L	Pairs	L Side	W	T	T	"	"	Splitdorf	M & C	"	.....	"	C
192	Schacht	B	2	5⅛	4½	21.0	185.7	"	Sep	Side	"	"	C	"	Dual	Bosch	"	"	Scheb ler	"	"
193	Sears	L	2	4⅛	4	13.6	106.9	"	"	"	A	.....	.....	"	Sing	Henrick	M & B	"	"	"	M

Buggy-Type Cars

194	Duryea	Buggyaut	2	3¾	3¾	.....	82.8	"	"	.....	"	.....	.....	"	Dual	K-W	Dry C	Hand	Heitger	"	O
195	Independent	H	4	5⅛	2½	42.0	206.3	L	Bloc	Side	"	.....	.....	"	Sing	.....	Opt	.....	Own	"	"
196	Sears	G-K	2	4⅛	4	13.0	108.9	"	Sep	"	"	.....	.....	"	"	Henrick	Bat	.....	Schebler	"	M

ABBREVIATIONS:—**Cylinder Type:** T, T-Head; L, L-Head; H, Valves-in-Head;*2-cycle motor. **Cylinders How Cast:** Sep., Separately; Pairs, in Pairs; Bloc, en Bloc. **Valve Location:** R. Side, Right Side; L. Side, Left Side; Opp., on Opposite Sides; H & S, Head and Side; **Cooling Type:** A, Air-Cooled; W, Water-Cooled; **Radiator:** C, Cellular or Honeycomb; T, Tubular. **Ignition:** H.-T., High-Tension; L.-T., Low-Tension; Ma-&-Brk., Make-and-Break. **Current Source:** M, or Mag., Magneto; B, or Bat., Storage Battery. C, or Dry C., Dry Cells. **Gasoline Feed:** P, Pressure Feed; G, Gravity Feed. **Motor Lubrication:** C, Circulating System ;M, Mechanical Oiler; F, Fly-Wheel Circulating System; G, Gravity System; O, Oil Fed with Fuel

Transmission and Running Gear Specifications of Independent Pleasure Cars for the 1911 Season

Transmission and Running Gear Specifications of Independent Pleasure Cars for the 1911 Season

Table No.	NAME OF CAR	CHASSIS MODEL	TRANSMISSION								BRAKES		RUNNING GEAR						BEARINGS										
			CLUTCH		GEARSET			Drive	Car Drives Thru	Rear Axle	Service	Em.	Wheel Base	Front Tires	Rear Tires	Front Sp'gs	Rear Springs	Front Axle	Crankshaft		Camshaft		Gearset	Front Wheel	Rear Axle	Clutch Sp'dle	Clutch Thrust	Str'ng Knu'le	Str'ng Gears
			Type	Friction Surface	Type	No. Spds	Loc.												Type	No.	Type	No.								
131	Paige-Detroit	B	M D	S&B	Sel	2	U M	S	R	Semi-F	Int	Ext	90	32x3	32x3	½ El	El	T	Plain	2	Plain	3	Plain	Ball	B&R	Plain	Ball	Plain	Plain
132	Paige-Detroit	C	"	"	"	3	"	"	"	"	Ext	Int	104	32x3½	32x3½	"	"	I	"	2	"	3	B&R	"	"	"	"	Ball	"
133	Parry	27	Cone	L	"	3	Amid	"	T	"	Int	Ext	104	32x3½	32x3½	"	¾ El	T	"	3	"	3	Ball	Roll	Roll	"	"	"	Ball
134	Parry	37–48	"	"	"	3	"	"	"	"	"	"	116	32x3½	34x3½	"	El	I	"	3	"	3	Roll	Ball	B&R	"	"	Plain	Plain
135	Parry	37–48	"	"	"	3	"	"	"	"	"	"	118	36x4	36x4	"	"	"	"	3	"	3	"	"	"	"	"	"	"
136	Paterson	30	"	"	"	3	U M	"	"	"	"	"	110	34x3½	34x3½	"	"	"	"	3	"	3	Ball	Ball	"	Ball	"	"	"
137	Paterson	40	"	"	"	3	"	"	"	"	"	"	118	34x4	34x4	"	¾ El	"	"	3	"	3	"	"	"	"	"	"	"	"
138	Penn	R T D	"	L&I	"	3	Amid	"	"	"	Ext	Int	105	32x3½	32x3½	"	"	"	"	2	"	3	Roll	"	"	Plain	"	Ball	Ball
139	Pennsylvania	B	"	"	"	3	R A	"	T&R	Float	"	"	122	36x4	36x4½	"	"	"	"	3	"	3	Ball	"	Ball	"	"	Plain	B&P
140	Pennsylvania	V	"	"	"	3	"	"	"	"	"	"	117	34x4	34x4½	"	"	"	"	3	"	3	"	"	"	"	"	"	"
141	Pennsylvania	F	"	"	"	3	"	"	"	"	"	"	131	36x4	36x4½	"	"	"	"	4	"	4	"	"	"	"	"	"	"
142	Pennsylvania	H	"	"	"	3	"	"	"	"	"	"	137	36x4	36x4½	"	"	"	"	4	"	4	"	"	"	"	"	"	"
143	Petrel	25–35	Frict	....	Frict	..	Amid	C	R	Dead	Int	"	96	32x3	32x3	"	"	"	"	3	"	3	Plain	"	"	..	"	"	Ball
144	Petrel	40	"	....	"	..	"	"	"	"	Ext	Ext	108	34x3½	34x3½	"	½ El	T	"	3	"	3	"	"	"	..	"	"	"
145	Petrel	45–55	"	....	"	..	"	"	"	"	Ext-J S	"	115	34x3½	34x3½	"	"	"	"	3	"	3	"	"	"	..	"	"	"
146	Petrel	65–75	"	....	"	..	"	"	"	"	Ext	"	118	34x4	34x4	"	"	I	"	3	"	3	"	"	"	..	"	"	"
147	Pickard	E F-G H	Cone	L&I	Sel	3	"	S	T	Semi-F	I&E	"	100	30x3	30x3	El	El	"	"	3	"	4	"	"	"	Plain	"	"	Plain
148	Pickard	E F-G H	"	"	"	3	"	"	"	"	"	"	104	30x3	30x3	"	"	"	"	3	"	4	"	"	"	"	"	"	"
149	Pilot	B	"	L&I	"	3	Amid	"	S	"	Int	"	118	36x4	36x4	½ El	½ El	"	"	3	"	3	Ball	"	"	"	Plain	"	B&P
150	Pilot	S	"	"	"	3	"	"	"	"	"	"	118	34x4	34x4	"	"	"	"	3	"	3	"	"	"	"	"	"	"
151	Primo	F P	M D	S	"	3	U M	"	T	"	Ext	Int	100	36x3½	36x3½	"	¾ El	"	"	3	"	3	"	"	B&R	Ball	Ball	Ball	Ball
152	Primo	L R	"	"	"	3	"	"	"	"	"	"	100	32x3½	36x3½	"	"	"	"	3	"	3	"	"	"	"	"	Plain	"
153	Rambler	63	Exp B	L&I	"	3	Amid	"	T&R	"	"	"	112	36x4	36x4	"	¾ El	T	"	3	"	3	Roll	"	Roll	Plain	"	B&P	B&P
154	Rambler	64	"	"	"	3	"	"	"	"	"	"	120	36x4½	36x4½	"	"	"	"	3	"	3	"	"	"	"	"	"	"
155	Rambler	64	"	"	"	3	"	"	"	"	"	"	120	37x5	37x5	"	"	"	"	3	"	3	"	"	"	"	"	"	"
156	Rambler	65	"	"	"	3	"	"	"	"	"	"	128	40x4½	40x4½	"	"	"	"	3	"	3	"	"	"	"	"	"	"
157	Rambler	65	"	"	"	3	"	"	"	"	"	"	128	37x5	37x5	"	"	"	"	3	"	3	"	"	"	"	"	"	"
158	Rayfield	A	"	I	"	4	R A	"	T	Float	Int	Ext	100	32x3	32x3	"	¾ El	I	"	3	"	3	Ball	Roll	B&R	Ball	"	Ball	Plain
159	Reading	40	Cone	A&L	Sel	3	Amid	S	R	Semi-F	Ext	Int	122	36x4	36x4	El	El	T	Plain	5	Plain	3	Plain	Roll	B&R	Plain	Ball	Ball	Plain
160	Roader	20	"	L	"	2	R A	"	T	.....	"	"	104	34x3	34x3	½ El	½ El	"	"	2	"	3	"	Ball	"	"	"	Plain	"
161	Roader	30	"	"	"	2	"	"	"	.....	"	"	104	34x3	34x3	"	"	"	"	2	"	3	"	"	"	"	"	"	"
162	Rogers	B	Frict	....	Frict	..	Amid	V	R	Dead	Int	..	90	40x1½	40x1½	Plat	El	I	"	2	"	2	Ball	Roll	Roll	..	"	"	"
163	Schacht	A-A	Cone	L&C	Sel	3	"	S	T	Semi-F	Ext	Int	120	34x3½	34x3½	½ El	¾ El	"	"	3	"	..	Roll	Ball	B&R	..	..	..	..
164	Schlosser	24–30	M D	S	"	4	"	"	R	Float	Int	"	120	36x4½	36x4½	..	½ El	"	"	3	Plain	2	Ball	"	Ball	Ball	Ball	Ball	"
165	Sibley	A	Cone	S&L	"	3	"	"	..	Semi-F	.....	Ext	106	32x3½	32x3½	½ El	El	"	"	..	"	3	Roll	"	Roll	Plain	"	"	Roll
166	Spoerer	D-A	"	L	"	3	R A	"	T&R	"	Int	Int	120	34x3½	34x3"	"	¾ El	"	"	3	"	3	Ball	"	B&R	"	"	B&P	B&P
167	Spoerer	C	"	"	"	3	Amid	"	R	Float	Ext	"	121	36x4	36x4	"	"	"	"	3	"	3	"	Roll	Roll	"	"	Plain	"
168	Standard	L-N	"	"	"	3	"	"	S	"	Int	R W	125	x4½	x4½	..	.....	"	"	4	"	4	"	Ball	Ball	"	"	Ball	Ball
169	Staver-Chicago	30	M D	S	"	3	"	"	T	Semi-F	Ext	Int	112	34x3½	34x3½	½ El	El	"	"	3	"	3	Roll	"	"	"	"	Plain	"
170	Staver-Chicago	35	"	"	"	3	"	"	"	Float	Int	"	117	34x3½	34x3½	"	"	C	"	3	"	3	"	"	Roll	"	"	"	"
171	Staver-Chicago	40	"	"	"	3	"	"	"	"	"	"	117	35x4	35x4	"	"	I	"	3	"	3	"	"	Ball	"	"	"	"
172	Staver-Chicago	40	"	"	"	3	"	"	"	"	Ext	"	124	36x4	36x4	"	"	"	"	3	"	3	"	"	"	"	"	"	"
173	Staver-Chicago	40	"	"	"	3	"	"	"	"	"	"	124	36x4½	36x4½	"	"	"	"	3	"	3	"	"	"	"	"	"	"
174	Stuyvesant	.....	Con B	"	"	3	"	"	TR&S	Semi-F	"	"	130	40x4	40x4	"	½ El	"	Ball	"	"	3	Ball	"	"	"	"	"	Plain
175	Stuyvesant	.....	"	"	"	3	"	"	"	"	"	"	124	36x4½	36x4½	"	"	"	"	3	"	3	"	"	"	"	"	"	"
176	Van	11	Cone	T	"	3	"	"	R	"	"	"	96	32x3½	32x3½	"	El	"	Plain	"	"	3	Plain	"	"	"	Plain	"	"
177	Velie	G	M D	S&B	"	3	"	"	"	Float	"	"	115	34x4	34x4	"	¾ El	"	"	3	Ball	3	Roll	Roll	Roll	Ball	Ball	"	Ball
178	Victor	40	"	"	"	3	U M	"	T	"	Int	R W	112	35x4	35x4	"	"	C	"	3	Plain	3	Ball	Ball	Ball	Roll	Roll	Ball	"
179	Virginian	A-50	Cone	"	"	3	Amid	"	"	"	Ext	Int	130	40x4½	40x4½	"	¾ El	I	"	3	"	8	Roll	Roll	Roll	Ball	Ball	"	"
180	Warren-Detroit	11	"	L&I	"	3	"	"	S	Semi-F	"	"	110	34x3½	34x3½	"	¾ El	"	"	2	"	3	Plain	Ball	"	Plain	"	Plain	Plain
181	Warren-Detroit	11	"	"	"	3	"	"	"	"	"	"	110	35x4	35x4	"	"	"	"	2	"	3	"	"	"	"	"	"	"
182	Washington	C-40	M D	S&B	"	3	"	"	T&S	Float	R A	R A	118	36x4	36x4	"	"	"	"	3	"	3	Roll	"	Ball	"	Plain	"	"
183	Welsh-Detroit	S	Cone	L	"	3	"	"	T&R	"	Ext	Int	122	36x4	36x4½	"	¾ El	"	"	3	"	3	Ball	"	"	"	Ball	"	"
184	Welsh-Pontiac	4-A	M D	S&B	"	3	R A	"	T	"	"	"	130	37x5	37x5	"	"	"	"	3	"	5	"	"	"	Ball	"	"	Roll
185	Wescott	1911	Cone	L&S	"	3	Amid	"	"	"	"	"	120	36x4	36x4	"	"	"	"	5	"	3	Roll	Roll	Roll	Plain	"	Ball	B&P
186	W. F. S.	A	M D	S	"	3	R A	"	R	"	E&I	"	112	34x4	34x4	"	Plat	"	"	3	"	3	Ball	"	Ball	Ball	"	Plain	"
187	Whiting	A	Cone	F&I	"	2	U M	"	T&S	Semi-F	Int	Ext	90	30x3	30x3	"	¾ El	T	"	3	"	3	Plain	Ball	B&R	Plain	Plain	"	Plain
188	Wilcox	35	M D	S&R	"	3	"	"	T	"	Ext	Int	115	34x3"	34x3"	"	"	I	"	3	"	3	"	Roll	Roll	Ball	Ball	"	B&P
189	Zimmerman	E	"	F	Plan	2	Amid	C	..	Dead	Int	..	80	30x3	30x3	¾ El	El	R	"	2	"	2	Roll	Ball	Ball	Plain	Plain	"	Plain
190	Zimmerman	L	"	"	"	"	"	"	"	"	"	..	95	30x3	30x3	"	"	"	"	2	"	2	"	"	"	"	"	"	"
191	Zimmerman	Z-40	Cone	L&S	Sel	3	"	S	R	Semi-F	.....	..	115	34x3½	34x3½	½ E	"	I	"	3	"	3	"	"	B&R	"	Ball	"	"
192	Schacht	B	"	S&T	Plan	2	"	C	"	Dead	R. W.	Rev.	103	32x3½	32x3½	"	"	C	"	2	..	..	"	Roll	Roll	..	Ball	"	"
193	Sears	L	Frict	..	..	..	..	..	..	..	..	..	72	34x3	34x3	..	..	R	"	2	Plain	..	..	"	"	..	Ball	"	"

Buggy-Type Cars

194	Duryea	Buggyaut	Frict.	S	..	..	..	S	..	"	"	..	84	38x1½	44x1½	El	½ El	I	"	4	..	..	"	Ball	Ball	..	..	"	..
195	Independent	H	"	S	..	2	..	C	..	"	"	Rev.	95	1½	1½	"	¾ El	T	Ball	2	Roll	2	..	B&R	B&R	..	..	"	..
196	Sears	G-K	"	..	..	..	..	..	..	..	..	..	72	2	2	..	..	R	Plain	2	Plain	..	..	Roll	Roll	..	Ball	"	Plain

ABBREVIATIONS:—**Clutch Type:** M. D., Multiple Disk; Frict., Friction; Con. B., Contracting Band; Exp. B., Expanding Band; D. S., Dry Segments. **Clutch Surface:** L., Leather; S, Steel; I, Iron; B, Bronze; F, Fabric; R, Raybestos; T, Thermoid; A, Asbestos; C, Cork. **Gearset Type:** Sel., Selective; Plan., Planetary; Prog., Progressive; Frict., Friction. **Gearset Location:** Amid., Amidships; U. M., In Unit with Motor; R. A.,On Rear Axle; **Drive:** S, Shaft; C, Chain. **Car Drives Through:** T. Torsion Tube; T R Torsion Rod; R, Radius Rods; S, Springs. **Rear Axle:** Float., Floating; Semi-F., Semi-Floating. **Brakes:** Em., Emergency; E. or Ext., External Contracting; I or Int., Internal Expanding; R. W., On Rear Wheels; J. S., On Jack Shaft; Trans., On Transmission; R. A., On Rear Axle. **Springs:** El., Elliptic; Plat., Platform. **Front Axle:** I, I-Beam; C, Channel; T, Tubular; R, Rectangular; "Hollow Rectangular Pressed Steel. **Bearings:** B, Ball; P, Plain; R or Roll., Roller

Growth of the Electric Car Industry

Census Demonstrates There Are Forty-Six Different Concerns Engaged in the Manufacture of These Machines—Apparent Stampede of the Agents Toward This Type of Motor Car

the electric field because of the activity of the Wood company, which is one of the pioneers concerns of the country, and it is estimated that there are at least 2,500 electric pleasure cars owned in the Windy City, most of them driven by women. Also, Chicago probably has more makes of electrics represented than in any other city, the list showing either agencies or branches for the Babcock, Baker, Broc, Columbus, Dayton, Hupp-Yeats, Ideal, Kimball, Ohio, Rauch & Lang, Studebaker, Waverley and Woods. Of these the Woods, Ideal and Kimball are made in Chicago, while most of the others are manufactured in western territory.

OHIO COUPE AS IT APPEARS IN ITS 1911 FORM

BAKER VICTORIA WITH TOP AND LEVER STEER

FEW realize the progress that has been made in that branch of the industry which devotes all its time to the manufacture of electric pleasure cars, and probably many will be surprised to know that at the present time there are forty-six concerns in this country which turn out this type of mechanically-propelled vehicles. Of course, not all of these are in the limelight right now. Some still are in an embryonic state, just getting on their feet, so to speak; others have been making cars for some time, but have made little progress, while there are probably one-fourth of them which have made good and which already are well established in the national mart.

Electrics in Chicago

The Chicago show affords the critics a fine opportunity to get a good line on the situation. The representation, while not complete, is good and the cars that are on view represent the trend in this branch of the industry. Still, there are several which are not in the show but which, nevertheless, are very much alive and doing a big business. The Chicago show has a better representation of this type, though, than New York, because of the edict of the A. L. A. M., which refused to permit the pleasure electrics to share space with the gasoline pleasure cars the first week. Only two or three took advantage of the opportunity to show among the electrics, so that the bulk of the representation falls on Chicago, which is keenly alive to the advantages of this.

Chicago always has been prominent in

Specifications in Brief of the 1911 Electrics

Make	Model	Price	Body	Seats	Drive	Batteries	Wheel Base (inches)	Tread (inches)	Wheels (inches)	Tire
Babcock.....	16	$3250	Touring Car	5	Chain	42 cells	105	56	34	Pneumatic
Babcock.....	11	3250	Town Car	6	Chain	42 cells	105	56	32	Optional
Babcock.....	14	2600	Coupe	4-5	Chain	36 cells	86	56	32	Optional
Babcock.....	12	2400	Roadster	3	Chain	42 cells	94	56	34	Pneumatic
Babcock.....	10	2300	Coupe	3	Chain	36 cells	78	51	32	Optional
Babcock.....	6	1900	Victoria	2	Chain	36 cells	78	51	32	Optional
Babcock.....	5	1600	Runabout	2	Chain	36 cells	78	51	32	Optional
Babcock.....	1	1400	Stanhope	2	Chain	40 cells	....	51	32	Solids
Baker.....	....	3500	Brougham	5	Shaft	40 cells	89	56	34	Pneumatic
Baker.....	....	3500	Landaulet	5	Shaft	40 cells	89	56	34	Pneumatic
Baker.....	....	2500	Roadster	2	Shaft	40 cells	95	56	34	Pneumatic
Baker.....	....	2300	Surrey	4	Shaft	28 cells	86½	56	36	Pneumatic
Baker.....	....	2200	Depot Wagon	6	Shaft	28 cells	92½	56	36	Pneumatic
Baker.....	....	1500	Suburban	2	Shaft	28 cells	82	56	34	Pneumatic
Baker.....	....	1000	Stanhope	2	Shaft	14 cells	68	48½	30	Pneumatic
Broc.....	25	2700	Coupe	5	Chain	30 cells	83	....	32	Optional
Broc.....	24	2500	Coupe	4	Chain	30 cells	80	....	32	Optional
Broc.....	22	2300	Coupe	3	Chain	28 cells	80	....	32	Optional
Broc.....	19	2100	Roadster	2	Chain	30 cells	83	....	32	Pneumatic
Broc.....	20	2000	Stanhope	2	Chain	28 cells	80	....	32	Optional
Columbus...	1220	2850	Coupe	4	Shaft	30 cells	87½	56	35	Optional
Columbus...	1202	2400	Coupe	4	Enclosed Chain	30 cells	87½	56	33	Optional
Columbus...	1200	2100	Stanhope	4	"	30 cells	76	56	33	Optional
Columbus...	1002	2000	Coupe	3	"	30 cells	76	56	33	Optional
Columbus...	1000	1800	Stanhope	2	"	30 cells	76	56	33	Optional
Dayton*....	101	2500	Coupe	4	Optional	30 cells	86	56	32	Optional
Dayton.....	103	2300	Coupe	2	Optional	30 cells	86	56	32	Optional
Dayton.....	104	2000	Victoria	2	Optional	30 cells	86	56	32	Optional
Detroit.....	10	2800	Brougham	4	Shaft	24 cells	85	56	32	Optional
Detroit.....	21	2700	Brougham	4	Chain	24 cells	85	56	32	Optional
Detroit.....	11	2600	Brougham	4	Shaft	24 cells	85	56	32	Optional
Detroit.....	22	2500	Brougham	4	Chain	24 cells	81	56	32	Optional

*Listed with chain drive; shaft drive $100 more and in nearly every instance the makers give an option on Edison batteries at an additional price, but batteries listed are of lead type

Well Illustrated in the Chicago Show

Trend in Construction Takes In Options of Chain or Shaft Drive and Pneumatic or Cushion Tires—Underslung Frames Also Appear—Four-Passenger Coupe Bodies Are Popular

While it may be so in some of the other metropolitan cities, in the case of Chicago there has been a recent stampede on the part of agents who heretofore have handled only gasoline cars to take on electrics also, it having become a recognized fact that the two go well together and do not clash in any manner. While this is the generally accepted belief, yet there are some electric car folk who insist that the best results are obtained when the electric is handled separately. They argue that the electric car business is of a far different nature than the gasoline and that to do well the men in charge must be familiar with the electric type from beginning to end, which is not the case generally with the gasoline car dealer, who has devoted most of his time to educating himself in his own particular line. Be that as it may, the fact remains that there are about half the makes carried by concerns who also sell gasoline cars.

FOUR-PASSENGER MODEL MADE BY KIMBALL

BAKER COMPANY'S TWO-PASSENGER RUNABOUT

One of the Arguments

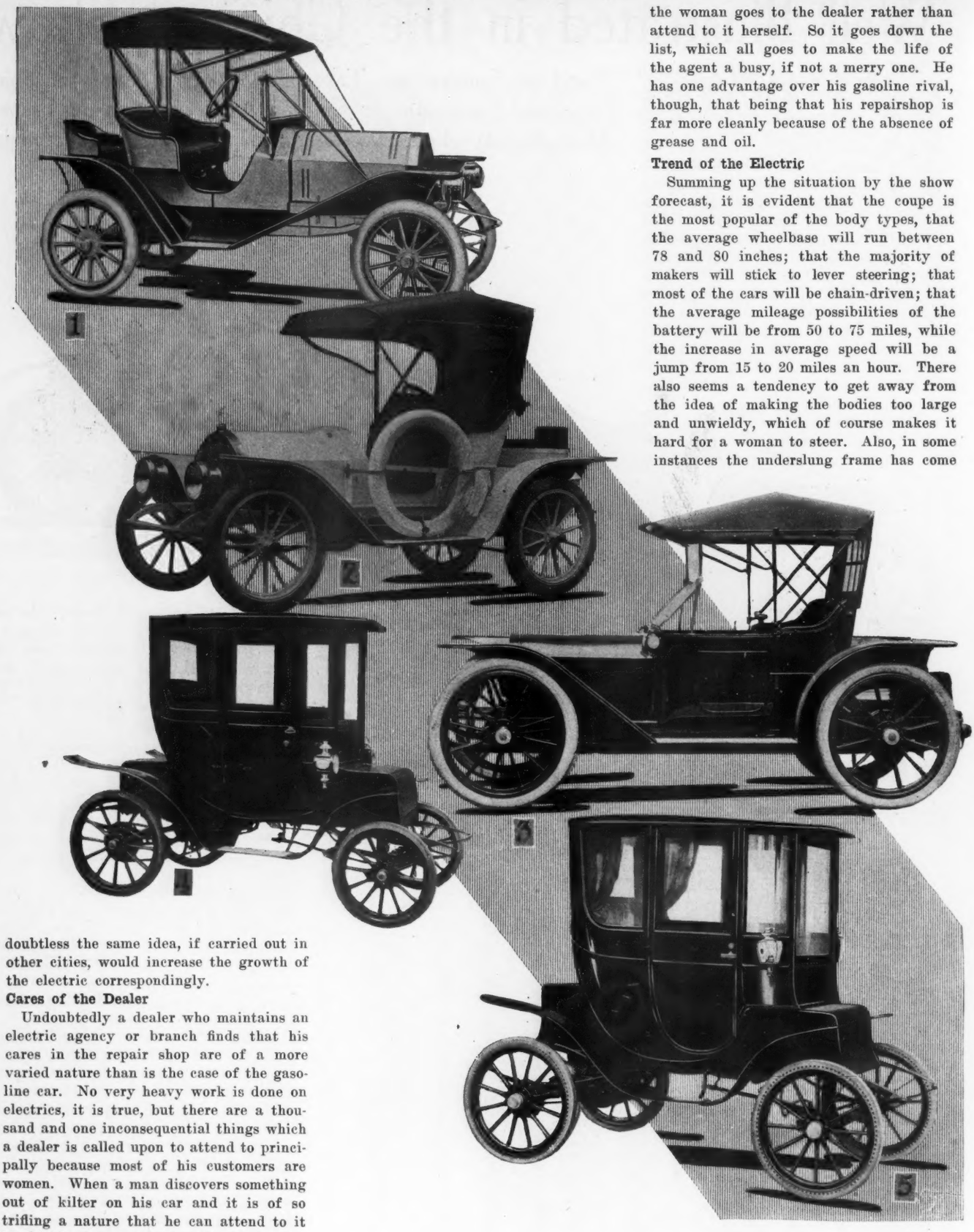
As an argument why the gasoline agents should handle the electric, it is pointed out that often it is easy to sell an electric to a man who has purchased a gasoline car, at the same time benefiting the purchaser, because he will have only one concern looking after his interests instead of two.

On the other hand, some of the practical men of the industry claim that the side line idea is a poor one from their standpoint and to back up their arguments they point out how it is necessary to maintain garages and charging stations and to carry equipment such as a gasoline car agent does not usually have in his establishment. Notwithstanding all this, though, it is evident that general progress is being made along these lines to such an extent that it will not be long before every large city will be so well equipped with charging stations that it will be no trouble at all to care for the electric trade. As an example of this, it might be noted that the Commonwealth Edison Co., of Chicago, now has sixty-six charging stations inside of the city of Chicago, while in the suburbs like Riverside, Evanston and Highland Park there also are charging stations. The installation of these has done much to popularize this type of motor vehicle in Chicago, and

Specifications in Brief of the 1911 Electrics

Make	Model	Price	Body	Seats	Drive	Batteries	Wheel Base (inches)	Tread (inches)	Wheels (inches)	Tire
Detroit	12	2400	Coupe	3	Shaft	24 cells	85	56	32	Optional
Detroit	16	2025	Victoria	3	Shaft	24 cells	85	56	32	Optional
Detroit	15	2000	Victoria	2	Shaft	24 cells	85	56	32	Optional
Detroit	24	1925	Victoria	3	Chain	24 cells	85	56	32	Optional
Detroit	23	1900	Victoria	2	Chain	24 cells	85	56	32	Optional
Hupp-Yeats	....	1750	Coupe	4	Shaft	27 cells	86	50	32	Pneumatic
Ideal	....	2000	Brougham	4	Chain	40 cells	92	56	30-32	Cushion
Ohio	G	2700	Brougham	5	Shaft	30 cells	80	56	36	Cushion
Ohio	D	2600	Brougham	4	Shaft	30 cells	80	56	36	Cushion
Ohio	F	2300	Victoria	2	Shaft	30 cells	80	56	36	Cushion
Rauch & Lang	....	2800	Ex-Coupe	4	Shaft	40 cells	86	56	34	Optional
Rauch & Lang	....	2600	Ex-Coupe	4	Optional	24 cells	81	56	34	Cushion
Rauch & Lang	....	2450	Victoria	4	Shaft	40 cells	86	56	34	Optional
Rauch & Lang	....	2300	Coupe	2	Optional	24 cells	81	56	34	Cushion
Rauch & Lang	....	1900	Stanhope	2	Optional	24 cells	81	56	32	Cushion
Studebaker	17	1850	Landaulet	4	Chain	32 cells	74	56	30	Optional
Studebaker	17	1750	Coupe	4	Chain	32 cells	74	56	30	Optional
Studebaker	17	1475	Victoria	3	Chain	32 cells	74	56	30	Optional
Studebaker	22G	1850	Coupe	2	Chain	24 cells	67	53	30	Pneumatic
Studebaker	22F	1200	Coupe	2	Chain	24 cells	67	53	30	Pneumatic
Studebaker	22C	950	Stanhope	2	Chain	24 cells	67	53	30	Pneumatic
Studebaker	22A	900	Runabout	2	Chain	24 cells	67	53	30	Pneumatic
Waverley	81	2600	Brougham	4	Shaft	32 cells	80	56	34	Optional
Waverley	75C	2400	Brougham	4	Shaft	32 cells	80	56	32	Optional
Waverley	70C	2150	Brougham	3	Shaft	32 cells	80	56	32	Optional
Waverley	76	1850	Victoria	3	Shaft	32 cells	80	56	32	Optional
Waverley	78	1700	Roadster	3	Shaft	32 cells	96	56	32	Optional
Waverley	74	1600	Stanhope	3	Shaft	32 cells	73	56	32	Optional
Waverley	69	1225	Runabout	2	Shaft	30 cells	72	56	32	Optional
Woods	1012	2900	Coupe	5	Chain	40 cells	86	56	30-34	Solids
Woods	1014C	2650	Brougham	4	Chain	40 cells	80	56	30-34	Solids
Woods	1014	2100	Victoria	4	Chain	40 cells	80	56	30-34	Solids

*Listed with chain drive; shaft drive $100 more and in nearly every instance the makers give an option on Edison batteries at an additional price, but batteries are of lead type



doubtless the same idea, if carried out in other cities, would increase the growth of the electric correspondingly.

Cares of the Dealer

Undoubtedly a dealer who maintains an electric agency or branch finds that his cares in the repair shop are of a more varied nature than is the case of the gasoline car. No very heavy work is done on electrics, it is true, but there are a thousand and one inconsequential things which a dealer is called upon to attend to principally because most of his customers are women. When a man discovers something out of kilter on his car and it is of so trifling a nature that he can attend to it himself he does not bother the dealer, but in the case of a woman it is different. If a tack comes loose in the upholstering she drives to the agent and calls upon him to fix it. It may be, also, that an incandescent light bulb is burned out, and the woman goes to the dealer rather than attend to it herself. So it goes down the list, which all goes to make the life of the agent a busy, if not a merry one. He has one advantage over his gasoline rival, though, that being that his repairshop is far more cleanly because of the absence of grease and oil.

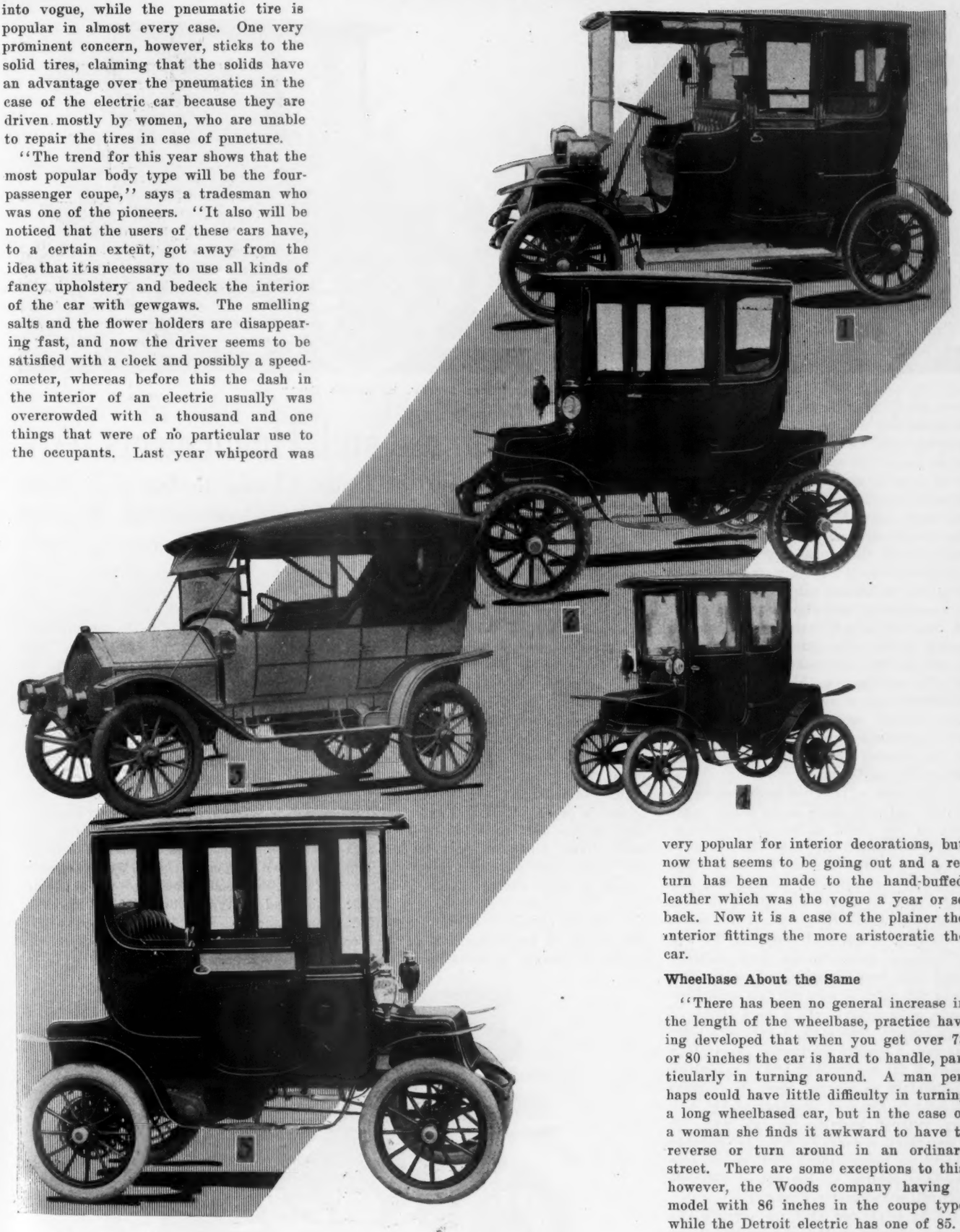
Trend of the Electric

Summing up the situation by the show forecast, it is evident that the coupe is the most popular of the body types, that the average wheelbase will run between 78 and 80 inches; that the majority of makers will stick to lever steering; that most of the cars will be chain-driven; that the average mileage possibilities of the battery will be from 50 to 75 miles, while the increase in average speed will be a jump from 15 to 20 miles an hour. There also seems a tendency to get away from the idea of making the bodies too large and unwieldy, which of course makes it hard for a woman to steer. Also, in some instances the underslung frame has come

1—Waverley With Rumble for Third Passenger
2—Babcock Roadster With Top and Spare Tire
3—Detroit Has Fore-Door Effect on Its Roadster
4—Coupe for the 1911 Market Made by Woods Company
5—Many Luxuries Are To Be Found on Waverley Coupe

into vogue, while the pneumatic tire is popular in almost every case. One very prominent concern, however, sticks to the solid tires, claiming that the solids have an advantage over the pneumatics in the case of the electric car because they are driven mostly by women, who are unable to repair the tires in case of puncture.

"The trend for this year shows that the most popular body type will be the four-passenger coupe," says a tradesman who was one of the pioneers. "It also will be noticed that the users of these cars have, to a certain extent, got away from the idea that it is necessary to use all kinds of fancy upholstery and bedeck the interior of the car with gewgaws. The smelling salts and the flower holders are disappearing fast, and now the driver seems to be satisfied with a clock and possibly a speedometer, whereas before this the dash in the interior of an electric usually was overcrowded with a thousand and one things that were of no particular use to the occupants. Last year whipcord was very popular for interior decorations, but now that seems to be going out and a return has been made to the hand-buffed leather which was the vogue a year or so back. Now it is a case of the plainer the interior fittings the more aristocratic the car.



1—Kimball Town Car or Limousine
2—The Rauch & Lang With Coupe Body
3—Babcock Touring Car Resembles a Gasoline Machine
4—Broc With One of the Company's New Coupe Bodies
5—Roomy Coupe Body Found on the Detroit Electric

Wheelbase About the Same

"There has been no general increase in the length of the wheelbase, practice having developed that when you get over 78 or 80 inches the car is hard to handle, particularly in turning around. A man perhaps could have little difficulty in turning a long wheelbased car, but in the case of a woman she finds it awkward to have to reverse or turn around in an ordinary street. There are some exceptions to this, however, the Woods company having a model with 86 inches in the coupe type, while the Detroit electric has one of 85.

"In general lever steer continues to have the call, although in the case of the Babcock the wheel steer, such as is found on gasoline cars, is fitted. The designers also have been working on the controller

STUDEBAKER COUPE AND THE BAKER SPECIAL EXTENSION COUPE

with the idea of simplifying it as much as possible. One good idea along this line is noted on the Detroit electric, which has a drum type of controller, which is manipulated by a little lever just above the steering lever, so that it is possible to control the speeds without the driver having to bend over.

"Nearly every concern will fit solid tires if it is desired, but the general vogue is a pneumatic, and also there is a choice of lead and Edison batteries. It is interesting in this connection to note the type of tire makes a difference with the number of cells that have to be used. With the Detroit electric there is a forty-cell eleven-plate battery used with hard tires, while when pneumatics are fitted the battery is of the twenty-four-cell thirteen-plate type.

Educating the Users

"The users of electrics have become educated and now there is no longer much demand for speed or excessive mileage. It is a recognized fact that from 50 to 75 miles on a charge is plenty for the average user, and that attempts to beat this generally mean injury to the battery in some form or another. Of course, it is possible to do some sensational stunts in the way of mileage performances with electrics fitted with lead batteries, but to get anything 100 miles or over the cars need ideal roads, good weather and a good driver. I have noticed that since a year ago there has been a marked increase in the average speed of the electric and now it is possible to maintain an average speed of 20 miles an hour to the full discharge of the battery without harming in any way the power plant, whereas formerly the average was in the neighborhood of 15 miles. This has been secured by the use of different gear ratios and motor windings

"I have noticed that the electric has become popular in the smaller towns because the cost of maintenance has been greatly reduced since the electric light companies have realized the chances of making money by operating charging stations in connection with their plants."

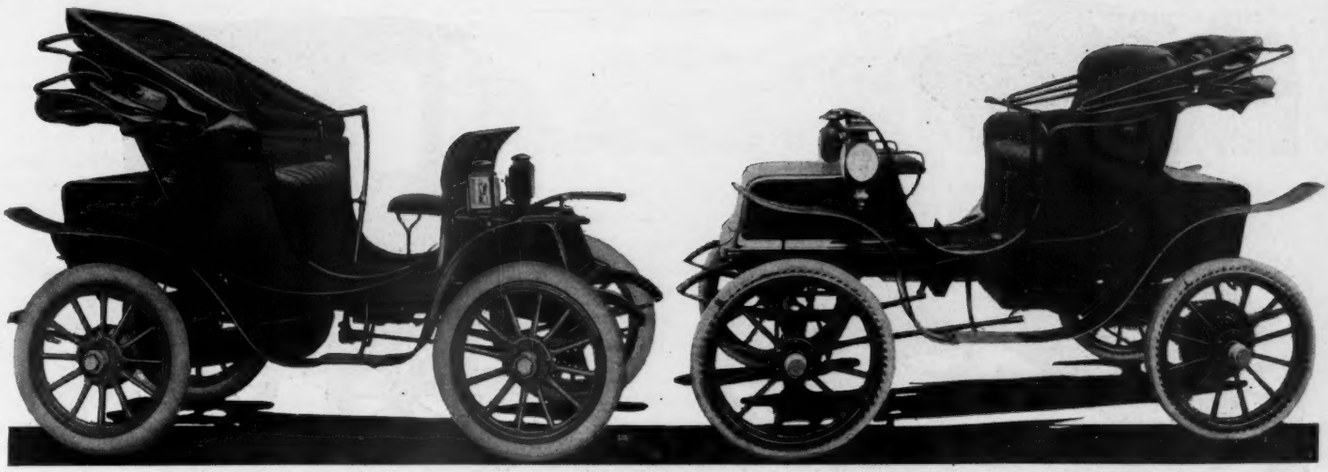
Some Changes and Refinements Are

Chicago Show Gives the Critics Chance to See Just What Designers of Electric Cars Have Done in the Way of Improving Their Product for the Year—Tendencies in Brief

A STUDY of the cars at the shows will disclose the changes and refinements that have been made in the past year. It will not need a close observer to note that the changes have not been of a radical nature, for with the makers of electric cars the aim is toward stability and against a yearly change in models. In the case of the Woods Motor Co., one of the new things is the axle, which is made of Krupp steel of the I-beam type, with the spring clips cast integral with the axle both front and rear. On the Woods the controller is of the drum and cylinder type, such as has been used in street railway work. The controller is provided with four speeds forward and two reverse, and covers a range from 5 to 20 miles per hour. The handle is provided with a Yale lock, which permits the operator to lock the handle in brake position so the car cannot be moved. A quick brake accessible open circuit emergency switch is provided so that when power is cut off by means of this switch it is impossible to close the circuit again until the controller handle is moved to the off position. This makes it impossible for the car to be started except through first speed.

The Woods motor is of the series type and made sufficiently large to withstand the discharge of the battery, so the latter acts as a safety valve against overheating of the motor. The standard battery equipment is a forty-cell 9 M. V. lead type, but there is space enough for a forty-four cell high-capacity battery or a fifty-four-sixty Edison battery. Hess-Bright ball bearings are used throughout the Woods chassis. The bodies come either in wood or aluminum and the types offered include the four-passenger coupe, the four-passenger brougham with a removable leather top and a four-passenger brougham.

WAVERLEY VICTORIA DESIGNED FOR TWO PASSENGERS



ONE OF THE NEW STUDEBAKERS AND THE RAUCH & LANG TWO-PASSENGER MODEL

Noted in the New Models for 1911

Thumbnail Sketches of the Woods, Detroit, Waverley, Babcock, Baker, Columbus, Ideal, Hupp-Yeats, Ohio, Broc, Dayton, Kimball, Studebaker and Rauch & Lang - Some of Details

Direct shaft drive is a feature of the Detroit electric which has been retained for this year, but which has been so improved that there is a straight path of power from the motor to the rear axle without chain or gear reduction. There is not a single moving part from the motor to the rear axle that is exposed, and the claim is made that this construction produces increased efficiency and a noiseless motor and gears. The Detroit electric people have brought out an underslung roadster model which has a wheelbase of 96 inches and which is fitted as a torpedo type and fore-door body and which carries 36-inch wheels, which are fitted with pneumatic tires.

In addition to this the company offers six different types of bodies on its shaft-drive chassis, the range taking in an extension brougham, a four-passenger brougham, a two-passenger coupe with a folding seat for a third person, a four-passenger victoria, a victoria of queen design and a victoria with a top. Chain-drive models also are furnished, and with them go choice of four different kinds of bodies. The company offers an option of lead or Edison batteries.

A New Waverley Model

The Waverley company has a new model and a four-passenger brougham which is somewhat similar to last year's model 75 C. The body of the car is built in a single piece, but is 3 inches wider than the 1910 style; the front has swelled side panels with rounded corners, French plate glass and the car is larger and roomier. The principal change in the Waverley is the low hang of the body, obtained by a change in the form of spring suspension, which brings the cells 2 inches below the top of the full elliptic spring. The lamps also have been changed and the length of the fenders increased. The Waverley high efficiency shaft drive enters into its third year without change, the principal feature being the use of herringbone gears connecting parallel shafts. The controller also is the same, being based on the principle of knifeblade contacts, with an interlocking device designed to make it impossible to change the speed direction with the power on or to start on any speed but the low. The Waverley electric roadster has been altered somewhat in that now the body is low-hung. There is a roomy rumble seat at the rear with a step to reach it, while the length of the car has been increased to 114½ inches and the wheelbase to 96 inches. A slight change is made on the runabout model in the fitting of a continuous fender, which has been substituted for the separate wheelguards formerly used.

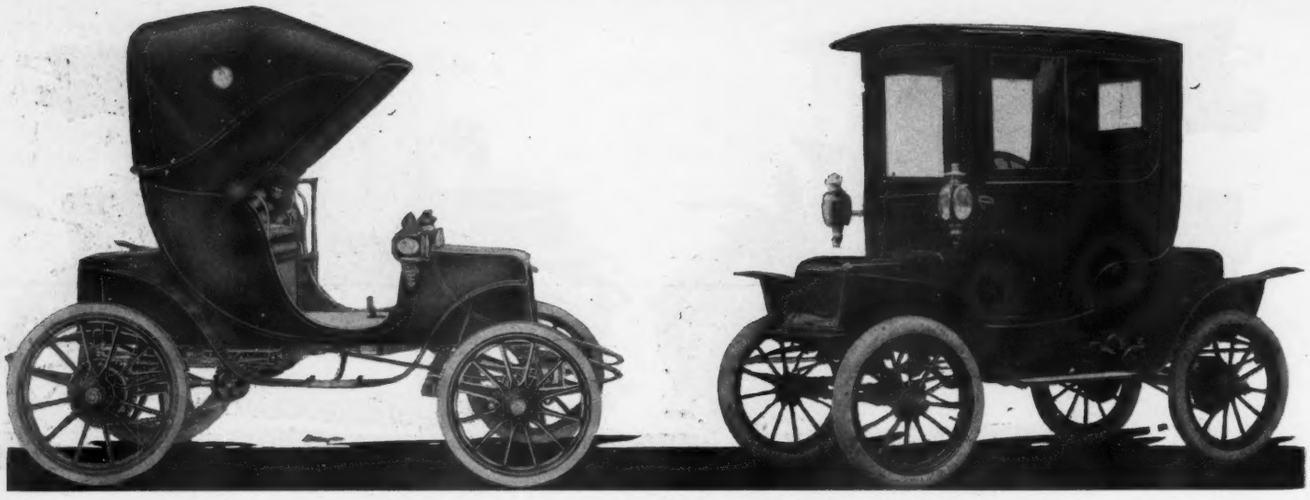
A NEW KIMBALL IDEA WITH RUMBLE IN THE REAR

Babcock Touring Car

The Babcock has come out with something out of the ordinary in the shape of a five-passenger touring car, which is built along the line of gasoline machine of similar type which is built to accommodate a sixty-cell Edison battery, and for which is claimed a mileage of 100 miles to the charge at the rate of 15 miles an hour. The other Babcock models, 5, 6, 10, 11, 12 and 14, are continued with additional equipment, which includes 8-day clocks in models 6 and 12 and chain covers on all models. All inclosed Babcocks are upholstered and have tufted ceiling and side cushions and are equipped with revolving chairs for the front seats in the four-passenger brougham. The battery equipment is the Philadelphia Storage Battery Co.'s high-capacity storage batteries, although Edison's are furnished if desired.

Features of the Baker

Bevel gearshaft drive is a feature of the Baker this year, as it was last, while another talking point is the wide range of choice in body styles, there being a great variety of types, including coupes, broughams, runabouts, victorias and even a depot wagon. The controller is of the drum type, giving six speeds forward and three reverse on one lever, with a safety device to prevent accidental slipping into



WOODS VICTORIA WITH TOP AND THE BABCOCK WITH COUPE BODY

reverse and shutting off power. The mechanical lock enables the owner to safeguard his car against theft by unauthorized persons. On the runabout, the runabout coupe, roadster, brougham and landaulet wheel-steering is used, while on all others the side lever is fitted. The motor is of four-pole design, series wound, and with a large commutator. It is attached to the frame by a three-point suspension system.

Columbus Encloses Chains

In looking over the Columbus electric one discovers something different in that the driving chains are encased, something like the gearcase that is used on a bicycle, which keeps the chains well lubricated and free from dirt and grit. The Columbus is of the shaft-drive type, which, with the enclosed chains, are new ideas for this year. The Columbus uses the cylinder type of controller, giving six speeds and offering a range of speed from 5 to 22 miles an hour. There are two chassis in the line, models 1,000, 1,002 and 1,202 being on one of them, 1,000 being a two-passenger stanhope and 1,002 a two-passenger coupe with an extra drop seat. The 1,202 is a four-passenger coupe. A thirty-cell 9 M. V. Exide battery is used, and the choice is given of either pneumatic or cushion tires. The four-passenger coupe, 1,220, is a roomy rig with a wheelbase of 87 inches and 34-inch wheels. Edison batteries are given at extra cost.

Some Ideal Features

The Ideal electric is in its home city at this show and comes in the shape of a brougham designed for four passengers. The motor is of the Westinghouse type and the Westinghouse controller is used. The batteries are forty-cell Exides, and chain-drive and lever-steer are other features. In the way of tire equipment the Ideal company is a believer in cushions, but offers an option on pneumatics. The wheels are 30-inch in front and 32-inch in the rear. In looking over the power plant it is noted that the motor is of the series parallel type, mounted on an aluminum frame having a three-point suspension. The floating type of countershaft is under the motor and may be removed without taking out the differential. This also applies to the entire power unit, for the motor and transmission also may be taken out separately.

In studying out the body lines, the Ideal company aimed at getting a car of a low-hung appearance, and its success in this line is shown by the fact that the steps are only 12 inches from the ground. The wheelbase, too, is long—92 inches—and the tread 56 inches. Extra wide doors are fitted with Yale locks, while an automatic safety locking device, also with a Yale lock, affords the owner additional confidence in his ability to leave the machine without danger of having some interloper make off with it. As an additional precaution locks also are provided for the windows.

Bow of the Hupp-Yeats

The Hupp-Yeats is one of the recent recruits, and this will be the first time it has appeared in the Chicago show. In many respects this car is a radical departure from electric practice in that it uses an underslung frame, while the sloping French type of hood conceals the batteries, which are carried in front. Still more striking similarity to the gasoline car is secured by the lines of the coupe body, which has a graceful curve of the roof and which is hung much lower than the ordinary electrics, placing the running board practically on a level with the floor of the body and about the heighth of the average curb. Elsewhere the car is also a departure from the conventional in that the chassis frame is of pressed steel of the channel section type and the chassis is equipped throughout with ball bearings. Power is transmitted direct to the rear axle from the motor through a single set of bevel gears, while the batteries are carried over the front axle. The motor is attached to the rear axle-gear housing and immediately forward of the axle itself, the idea being to contribute the weight evenly and maintain the balance.

One of the features of the Hupp-Yeats is the unusually large seating space, the rear seat being 18 inches wide by 44½ inches long and the front 17 by 42½, leaving 18 inches between the seats. The wheelbase is 86 inches and the tread 50, while the tires are 32 by 3½.

Ohio's Disk Controller

A magnetic disk controller, which is located on the steering arm, is one of the features of the Ohio for 1911. This controller is operated by slight rotary motions forward and back controlling the running speeds of the car, which are held in place by the magnets, which are located under the front hood. This disk control cuts out the side lever idea, which is operated by finger and roller motions.

In addition to this novelty the Ohio people made a change in body construction, adopting a large type, which is 58 inches from front to back and 47 inches width of belt measurement. Aluminum enters largely into the trimmings of the body, being used on the hood, front and rear and also around the doors. Another body feature is that the windows drop completely out of sight, so that the occupants of the car have a full view of the road, while the door is extremely high and wide, being 24 inches by 5 feet.

The chassis has several novel features, one of which is that it slopes in the rear and has a graceful curve in the center to permit of bringing the step closer to the ground. There is a ball-bearing suspension

which carries the electric motor, which is attached to a ball on the sliding sleeve, which permits of keeping the driving power in direct alignment with the shaft. A floating rear axle is used, while the front axle is of the I-beam type. There is a double expanding internal brake on the rear system, while none is used on the driving shaft or motor.

The Broc Line

A roadster, a stanhope, a three-passenger coupe and two four-passenger coupes comprise the Broc line for 1911. In general the line does not depart from the conventional. Both the roadster and the higher priced four-passenger coupe have an 83-inch wheelbase, whereas in the others this measurement is 80 inches. A choice of batteries is given, the offering consisting of a thirty-cell, eleven-plate regular or an Ironclad or Edison on the roadster and the two four-passenger coupes, while on the other two is a twenty-eight-cell battery. The roadster takes pneumatic tires, but on the others an option is given on pneumatic or cushion.

Dayton Electromobile

One of the features of the Dayton electromobile, made by the Dayton Electromobile Co., is the simplicity of its control and operation, and not the least noticeable point in this connection is the steering wheel, which is of the hinged type, it being possible, by means of a joint at the floor, to elevate and lower the steering column when it is desired to get in or out of the driver's seat. There are expanding hub brakes, operated by the foot, on the rear wheels, where there also is a motor brake, also operated by the foot. The company has made no departure from its body styles and again offers a four-passenger and two-passenger coupes and a victoria. Again there is an option of chain and shaft drive, while there is but one chassis, in which the wheelbase is lengthened from 80 to 86 inches. The width of the front seat has been increased slightly. The controller is a lever, and now there are six forward speeds and one reverse,

where there used to be but four. The weight of the victoria has been increased 100 pounds and the coupe 150. There is an option of batteries—Exide or Edison, the former being thirty cells instead of the twenty-eight of last year. Another feature is that the victoria body is interchangeable with the coupe.

Kimball Makes a Limousine

Although the C. P. Kimball Co., of Chicago, is known primarily as a body-making concern, still it finds time to manufacture electric pleasure cars, mostly to order. In line with this one of its offerings for the present season is what is termed a station wagon, but which in reality is an electric limousine in that it carries an enclosed body with a capacity of six—four in the tonneau and two on the front seats. This limousine is fitted with solid tires, has wheel steer and a wheelbase of 100 inches. The motive power is derived from a forty-two cell thirteen-plate battery. Another Kimball is an inside-drive coupe with either wheel or lever steer and solid tires, while a novelty is a George IV. phaeton, the body on which is constructed along novel lines.

The Rauch & Lang Line

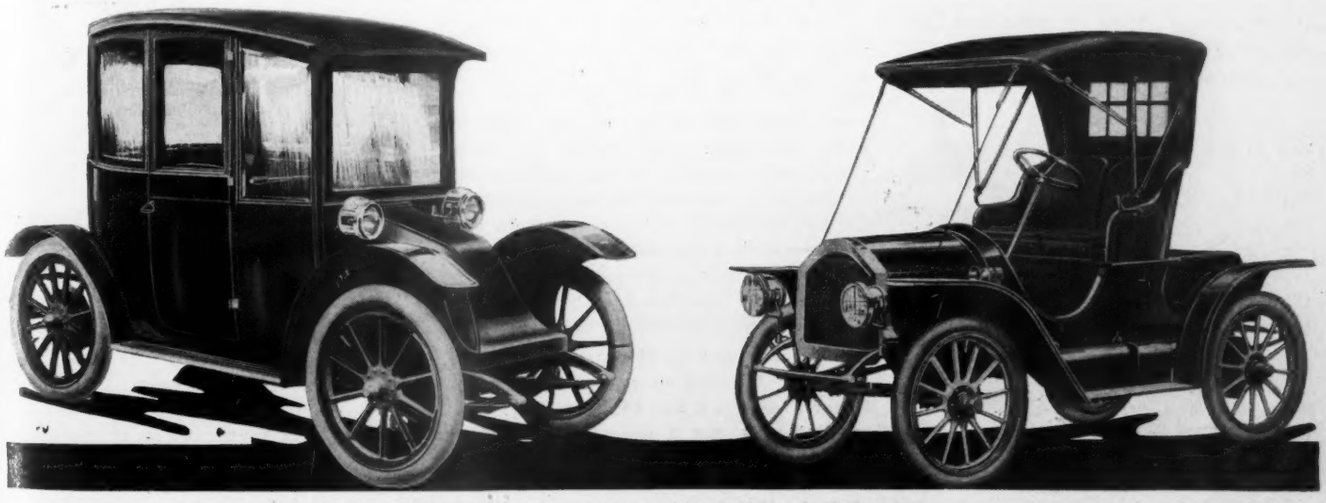
There is considerable variety in body styles offered in the Rauch & Lang line for 1911, starting with a large extension coupe and including a victoria, small extension coupe, a coupe and a stanhope. In general the line is conventional, except that on the large extension coupe shaft-drive is used, while the enclosed chain-drive is fitted to all the others with the exception of one of the stanhopes, which has an open-chain drive. The power unit of the inclosed-chain car consists of a bronze casting supporting the motor, controller, resistance and countershaft, and provides for the complete enclosure of the silent chain, motor and controller. A novelty on the R & L cars is found in the lighting scheme, the side lamps having especially designed reflectors which eliminate an extra headlight.

Some New Studebakers

Although continuing the four models of previous years, the Studebakers have added three new ones for this season, in which are incorporated many of the new ideas in the electric car construction. The newcomers include a landaulet, coupe and victoria, the general characteristics of which are the same, the difference being more in body equipment than mechanical details. A thirty-two-cell, 9 M. V. plate battery is used; the wheelbase is 74 inches, and an option is given on tires. The four old models are built on one chassis, the body styles including a runabout, coupe, stanhope phæton and a convertible coupe.

Chicago is particularly prominent in the electric field, largely because of its magnificent system of boulevards, which permits motorists to travel nearly 50 miles without using the same road twice, and also because of its being a pioneer in a manufacturing way. Within the last few years Chicagoans have realized the advantages of the electric for city use, and particularly so in winter, it being possible for owners of such cars to use them daily without the dread of having hard work starting a cold motor. The electric coupe also is most comfortable in winter because of its enclosed body, while the snows of winter apparently do not make the going hard.

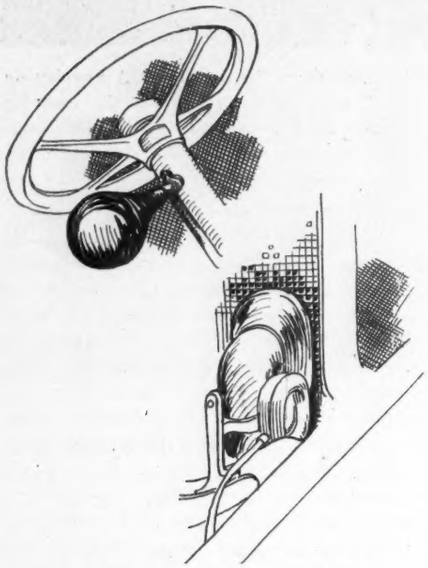
With the women the electric is found most handy for shopping expeditions, and inside the loop district it is no uncommon sight to see the streets lined with these cars in the vicinity of the fashionable retail department stores.



HUPP-YEATS, A NEWCOMER, AND BROC RUNABOUT WITH TOP

Development of the Many Little Things

One of Changes Brought About Is Placing of the Horn on Steering Column, As on the Marmon—Rambler Fits Gauge by Which Quantity of Gasoline in Tank May Be Ascertained



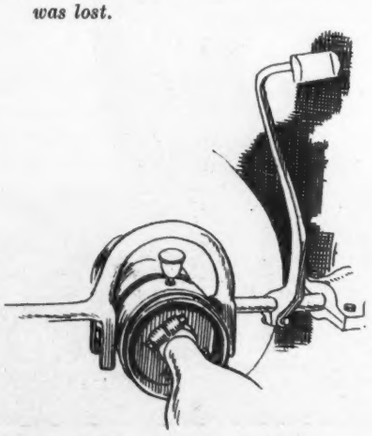
MARMON HORN AND BULB LOCATIONS

WHEN it is stated in a motor-car description that a number of slight improvements and refinements are to be found in the new models, etc., such words must not be interpreted as idle chatter. There are many cars now on the market that remain practically unchanged from year to year, except for these slight improvements and refinements; and, slight though they may be, their importance is often very great. It is generally a case of—

For the want of a nail the shoe was lost,
For the want of a shoe the horse was lost,
For the want of a horse the rider was lost,
And for the want of the rider the kingdom was lost.

This verse is applicable to many features of the motor car. Taking the motor crankcase, for instance—

For the want of split washers the nuts were lost,
For the want of the nuts the oil was lost,
For the want of the oil the motor was lost,
And for the want of the motor the race was lost.



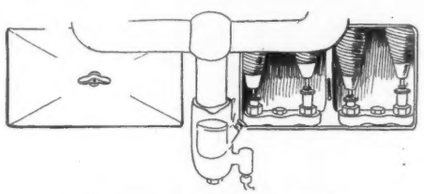
CONE CLUTCH BRAKE ON ENGER

It is the development of the little things—the little conveniences—that experience has brought out that has changed motoring from a fascinating hardship into a most popular and pleasant amusement.

Thinking for Themselves

Following in the course of least resistance and remaining in the rut, so to speak, has been characteristic of a great majority of those to whom the responsibility of the arrangement of fittings and the adoption of improvements has fallen. But in the past 2 or 3 years several makers have broken away from the beaten path, with the result that there is now fewer duplications of a leading maker's good and bad ideas, and designers are beginning to think for themselves, as is indicated by the illustrations shown herewith.

There was a time when the only practical place for horn bulb seemed to be

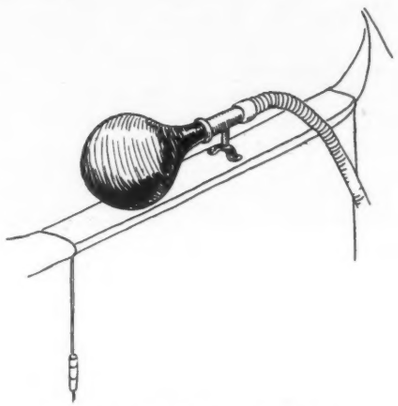


DIAMOND T'S ENCLOSED VALVES

down around the center or forward upper portion of the side panel of the driver's seat, where when the top was up and the side curtains in place, said horn bulb was ungetatable. The present season shows much originality in this respect. The Marmon horn bulb is attached to the steering column, where it may be conveniently manipulated by the right hand of the driver. A single piece of metal tubing, also attached to the steering column, conducts the air from the bulb down to a short flexible tube connection at the bottom end, which communicates with the horn, located just behind the lower right-hand corner of the radiator under the hood. Thus, these parts are eliminated as outside fittings and require no polishing. Another convenient position for the horn bulb is to be found on the White cars, it being mounted horizontally on the upper edge of the fore door, in easy reach of the right hand of the operator, side curtains or no side curtains.

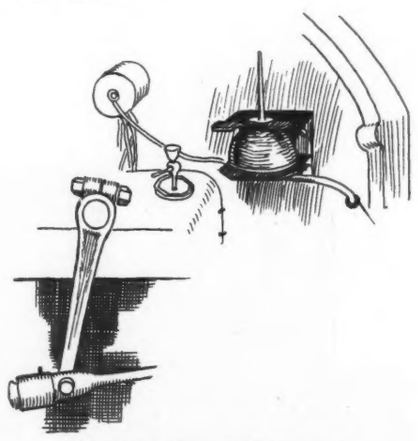
Rambler Features of Merit

In the Rambler cars several original features of merit are to be found: The gasoline tank has a gauge upon it that eliminates the necessity of having to use a stick or the like to estimate the amount of fuel in the tank; a very convenient



WHITE HORN BULB ON DOOR RAIL

means is provided for turning on the auxiliary gasoline supply, and the filler cap is generously large in diameter. The latches of the tonneau doors are of an unusual and anti-rattling design. A specially designed knob is to be found on the upper end of the gear-shifting lever, which conforms to the palm of the hand and permits of a natural and comfortable grip. A specially designed grease gun is secured to the transmission gearcase cover, from which the plunger may be readily removed for the replenishment of the supply of grease in the case, so that it is not necessary to remove the gearcase cover for this purpose; and among other things, the danger of dropping a stud or nut into it is eliminated.

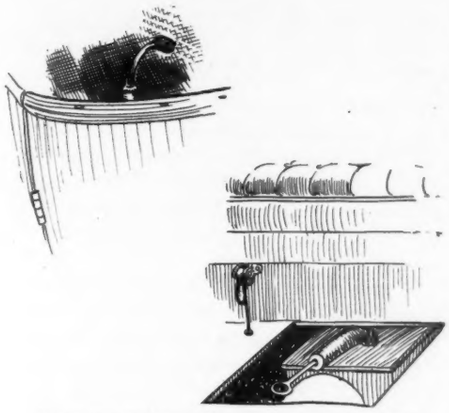


MARMON'S OILING FACILITIES

On the right rear fenders of these cars a specially designed and securely attached number plate bracket is mounted; this is a feature to be found on one or two other prominent makes of cars this year, and one that is deserving of attention. The seven-eighths scroll elliptic rear-spring

That Go To Make Motoring Enjoyable

Another Innovation Is Use of Two Independent Ignition Systems, Utilizing Only One Set of Spark Plugs—Some Chassis Lubrication Features—Clutch Brakes Are of Various Designs

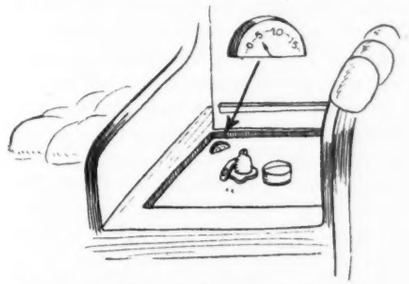


RAMBLER GEARSET LEVER AND GREASE GUN

design, also to be found on these cars, is illustrated in one of the sketches, and a vast improvement in the riding qualities of the car is claimed for it.

Independent Ignition Systems

In the ignition system of the motor another innovation is present whereby practically two independent systems are used, with but one set of spark plugs; a high tension switch being provided on the



RAMBLER GASOLINE GAUGE, VALVE AND CAP

front of the dash under the hood over the engine, with an operating lever passing through the dash, which may be operated with the foot of the operator if desired. The cables and terminals of this switch are thoroughly encased and insulated in a tube so arranged as to protect the cables from coming in contact with metal portions of the engine.

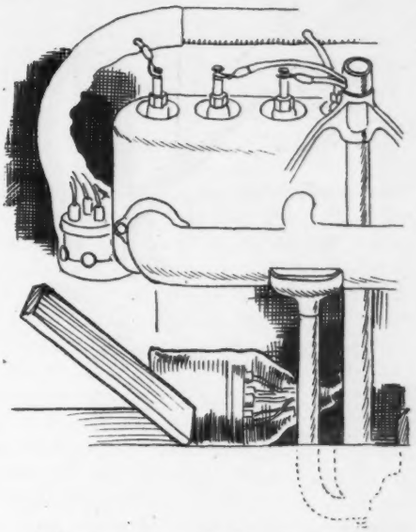
The relief cocks of the engine cylinders can all be simultaneously opened by means of a rod which communicates with the valves of each, and which passes through the radiator so that it may be conveniently operated to facilitate starting. Another notable detail of these relief cocks is that a small tube is secured to each, which is directed down into the mud pan; these tubes prevent oil from being sprayed onto the magneto and other external motor fittings when the motor is operated with the relief cocks open, and besides promoting cleanliness they have other advantages. Before passing from this car another commendable feature was noted: In a handy location under the hood beside the motor and on a simply designed bracket is mounted a hand oilcan with a cap on its nozzle, secured with a coil spring.

Hand Oilcans Conveniently Placed

There are a number of moving parts on the exterior of a motor whose bearing surfaces are not lubricated by the automatic lubrication system of the motor, and a number of manufacturers have realized that unless a hand-oiler is more convenient to get at than when stored away in the bottom of a tool box, these external bearings are neglected and the operation, wearing qualities and reputation of the motor unfavorably affected. On the Marmon cars a hand oiler is held in a clip attached to the front of the dash.

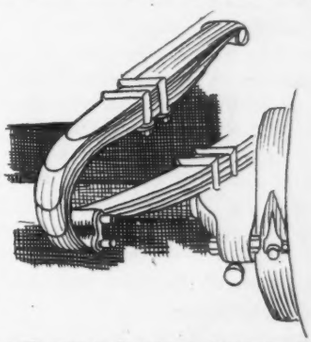
The lubrication of other features of the chassis has also come in for no small amount of attention, as is evidenced by the fitting of effective and substantial grease cups on all spring-shackle bolts, brake rods, clutch collars, clutch and brake operating mechanisms, steering gear bearings, knuckles and joints, rear-axle end bearings, and in fact on almost every conceivable place where lubrication is required. Examples of most of these are shown in the illustrations. The clutch collar of the Enger car has a grease cup of very generous capacity. Grease cups must be large, for the larger they are the less often do they have to be refilled and the less liable are they to be neglected. Even the joints of the steering rod connections on the Marmon cars are provided with grease cups.

While on the subject of improvements and refinements to be found in the lubri-



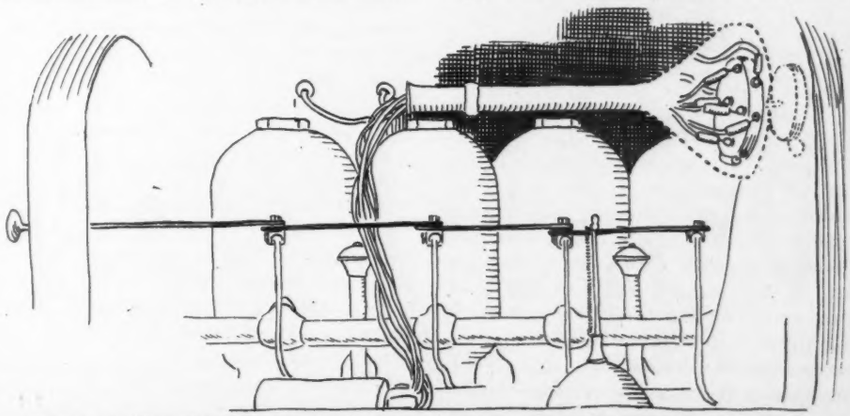
MOLINE IGNITION DEVICES CARED FOR.

cation of the motor car, attention should be called to the many facilities provided in connection with the internal lubrication of the motor. The motorist no longer has to drop his mud pan or stop every few

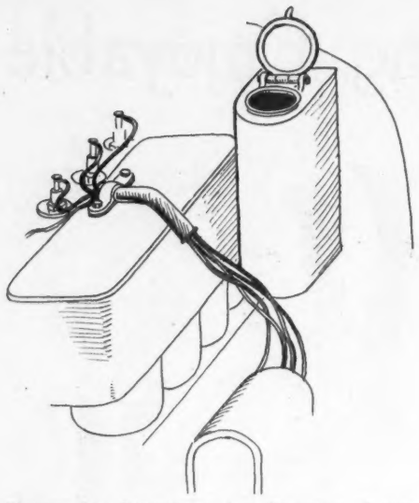


SEVEN-EIGHTHS ELLIPTIC RAMBLER REAR SPRINGS

seconds in the process of replenishing the oil supply in the motor, to look under the car to see whether or not the proper level in the crankcase has been reached, as is supposed to be indicated by a dripping of the superfluous oil from a pet cock which is generally clogged with dirt. Now-a-days, either a gauge glass or a float indi-



RAMBLER'S HIGH-TENSION SWITCH FOR TWO IGNITION SYSTEMS AND ONE SET OF PLUGS

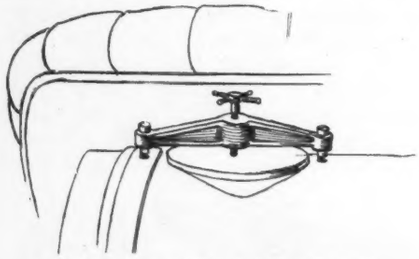


White Oil Reservoir and Ignition Cables

cator is conveniently and visibly located on or near the crankcase, and in close proximity to the filled cap so that replenishment of the supply may be accomplished without interruption. Filler caps also are more accessibly located and sufficiently wide-mouthed to permit of replenishment direct from a can without the use of a funnel; and to be sure this is a vast improvement over many motors still in use in which a specially designed funnel is required in order to direct a flow of oil into the motor crankcase or gasoline into the supply tank. A good example of what might be termed an advantageously located and wide filler opening is that of the oil reservoirs on the White gasoline cars; the cover is a simple one on a hinge, and when the opening is uncovered a man can stick his hand into the oil reservoir. The same is true of the caps on the gas and oil tanks of the Moon roadster.

Ignition Appliances

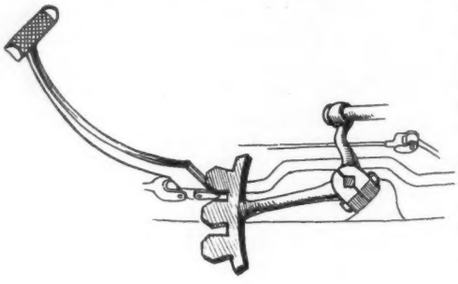
Perhaps no feature of the motor car has been given more attention than the ignition appliances. Manufacturers of mag-



Large Filler Cap on Moon Roadster

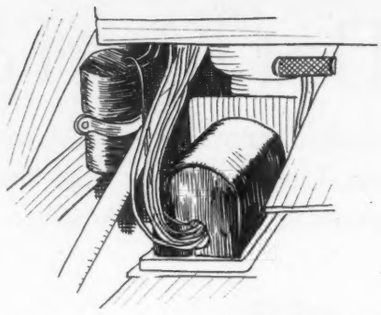
netos, coils, batteries and other ignition appliances have made great strides in the way of improvement of their respective products, and the motor car makers have supplemented the efforts of the manufacturers of ignition outfits with care and skill in the arrangement and fitting of these outfits on the cars. The results of this are that ignition troubles are considerably reduced. Makers of ignition products have in the majority of cases learned wherein the weaknesses of their devices lay, unsuitable materials have been replaced with more suitable ones, errors in design have been corrected, better oiling facilities are provided, the wearing qualities increased, and all fittings and connections are of a more durable design and construction. In addition to this, instead of rendering their devices un-get-at-able, withholding as much information as possible from the motoring public, and surrounding them in a veil of mystery, makers of magnetos, coils, batteries and the like, now open the doors of their factories to the representatives of reputable technical and trade publications and explain to them the design, construction and methods of their manufacture; instruction books, wiring diagrams, photographs and drawings showing every detail of design and operation are spread broadcast, and an enthusiastic and conscientious effort is made to educate the user of their devices in the proper care and adjustment of them.

As for the motor car manufacturer, suffice it to say that in most cases, the ignition devices are so arranged that the ad-



Locking Device on Maxwell Gear Shifter

justments and general care of the instruments may be easily maintained; and the wire cables are as short, neatly and simply arranged, and as amply protected as their ingenuity could devise or facilities would permit. On the Moline cars both the magneto and timer distributer of the double ignition system are provided with covers of a water, oil and dustproof material, which not only protects the devices themselves but extend to the ends of the insulating tubes or cable conduits. Thus the cables are protected throughout almost their entire lengths. In the illustration showing these attention is also called to

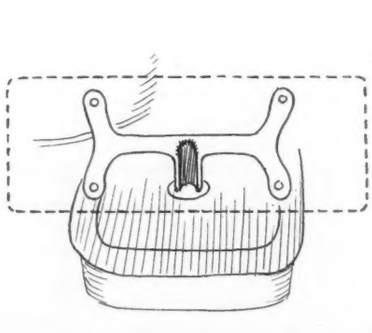


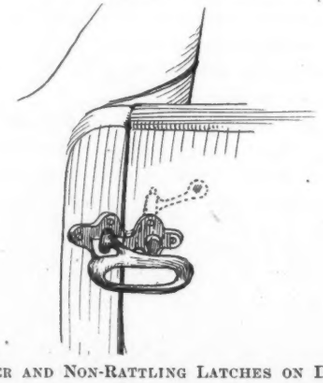
Maxwell Magneto and Coil Under Dash

the hinged sill portion giving access to the magneto and carbureter adjustments. On the Diamond T, a cable conduit of simple and efficient design is fitted, and the outlet hole for each spark plug cable is provided with a soft rubber bushing to prevent fraying of the insulation.

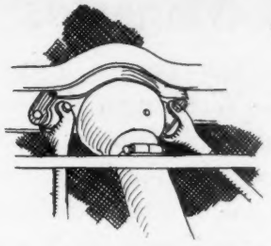
A good example of how a magneto may be arranged at the rear end of the motor to facilitate its connection to its driving mechanism, and to render other features of the motor more accessible, without having to put the magneto itself in an inaccessible position, is shown on one of the Maxwell cars. Both the magneto and coil are located near the rear left corner of the motor under the footboard, and a large section of the footboard is so designed that it can be removed readily and easy access to the magneto and coil obtained. The practice of removing the coil from the dash is also fast becoming popular; for by placing the coil out of sight, the coil box is not required, and the expense of the outfit reduced, it is possible to put better material in the coil without raising its price, the appearance of the clear dash is both pleasing and practical, and it is a step in the right direction.

In order to facilitate adjustment of the timing of the magneto, a number of cars this year have adopted the perforated flange coupling shown in one of the illustrations. It consists simply of two flanges of similar design, one of which is attached to the magnetoshaft and the other to the drivingshaft. They are arranged face to face and have a series of holes near their circumferences which register. Two or four bolts are used to secure the flanges together, and to change the timing of a magneto it is only necessary to remove these bolts, change the registration of the





Rambler Has Number Bracket on Rear Fender and Non-Rattling Latches on Doors



HALLADAY'S IMPROVED TORQUE TUBE SUPPORT

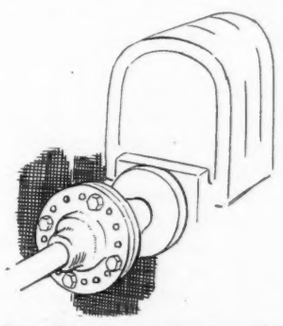
holes one way or another and replace the bolts. Thus there is no necessity of removing the cover of the engine gear housing in order to shift the magneto driving gear back or forward a tooth or two to obtain the same result, an operation which on many cars requires the removal of the radiator and other features of the motor before access to the engine gears is possible.

Control Mechanisms Refined

In the control mechanisms of the motor, brakes, and gearset, much improvement is to be seen. For the control of the ignition devices and carbureter of the motor, adjustable ball and socket joints are very popular this year, and in the arrangement of the operating levers, rods, gears and cams, many ingenious little details are shown.

Brake adjustments are greatly facilitated; greater leverage is obtained in the operating pedals and hand levers so that the brakes are more easily applied; means are provided to prevent the parts from rattling and the brake bands from dragging; braking surfaces are increased, improved friction linings are employed, leakage of oil from the rear-axle ends has been prevented in various ways so that brake efficiency and reliability is increased, and more suitable equalizing mechanisms are to be found on many cars.

Shifting levers for the transmission mechanisms also have been arranged in more practicable positions, grease cups are provided on their bearing surfaces so

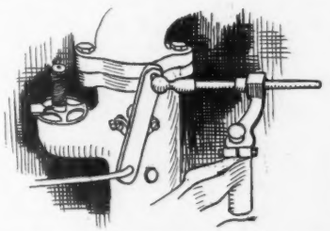


THE NEW PERFORATED FLANGED MAGNETO COUPLING

that binding for the lack of lubricating facilities is eliminated; and locking devices are fitted which render them practically fool-proof; that is, means are provided which make it impossible to shift gears without first disengaging the clutch, and the clutch cannot be let in unless the gears are either in a neutral position or properly meshed. Such a device is to be found on the exterior of the Maxwell gearset, shown herewith; there is an arm secured to the gear-shifting rod of the gearset which has a sector with three teeth, at the end of it. These teeth are adapted to engage the clutch-operating pedal and hold the clutch out when the gears are not properly meshed, and to prevent shifting without first disengaging the clutch.

Retarding Spinning Clutches

Clutch brakes, adapted to retard the spinning of the clutch when released and thereby facilitate gear changing, are to be seen on a number of cars this year and much originality is to be found in their design, few if any to be found on the various makes being alike. On the Enger car a regular cone clutch is employed, the revolving clutch collar of the transmission



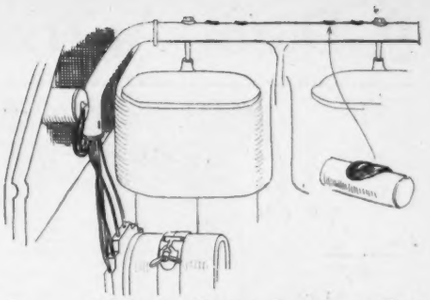
CINO'S CARBURETER CONTROL RODS

clutch mechanism being recessed to form the female portion of the clutch brake, and the cone or male portion being adjustably secured to the shaft between the transmission clutch collar and gearset.

Enclosed valve-operating mechanisms are now to be found on several motors; they have many advantages which the exposed mechanisms do not possess. A motor with enclosed valves is more apt to be kept clean because of the ease with which it may be done; with the valve operating mechanisms enclosed, the accumulation of dust and dirt thereon is prevented, thorough lubrication of the pushrods may be automatically maintained, and their wearing qualities consequently greatly improved. Two readily removable oiltight inspection plates of this character are to be found on the side of the Diamond T motor, as illustrated, and special means are provided for the lubrication of the valve tappets.

Chassis Features Not Overlooked

The driving mechanisms of the motor car also show many refinements and improvements both in design and construction. Torsion tubes are reinforced where weaknesses have been found, radius and torque rods are more accurately designed and arranged, and their means of attachment to the cross or side members of the frame or the torque tube in front, and the rear axle in the rear, is such that all strains are properly cared for and greater flexibility of power transmission and spring action obtained. Improvements in the design of the casings for universal joints tend toward the adoption of metal housings of the telescoping or ball and

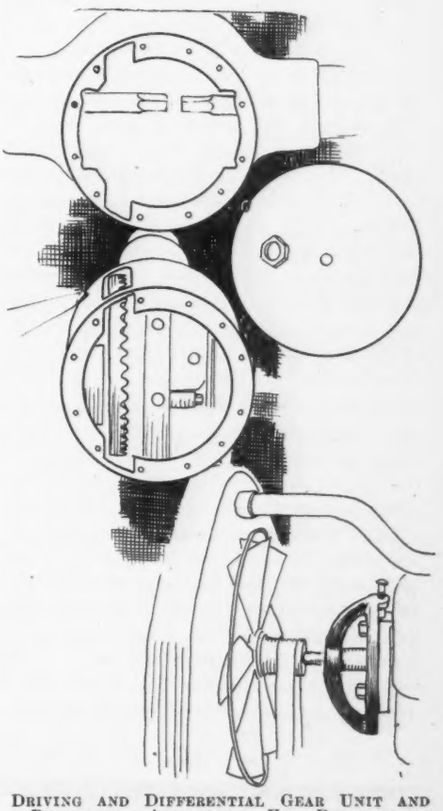


DIAMOND T'S RUBBER-BUSHED INSULATING TUBE

socket type, which may be readily packed with grease and more readily handled than leather boots. Such improvements are exemplified in an illustration of the Halladay torque-tube and radius rod attachment to the cross-member of the frame. The radius rods are attached to the frame through swivel joints at their forward ends, and the end of the torsion tube rests in a large hollow ball and socket joint which forms a greasetight housing for the universal joint of the propellershaft.

Improved Axle Assembly

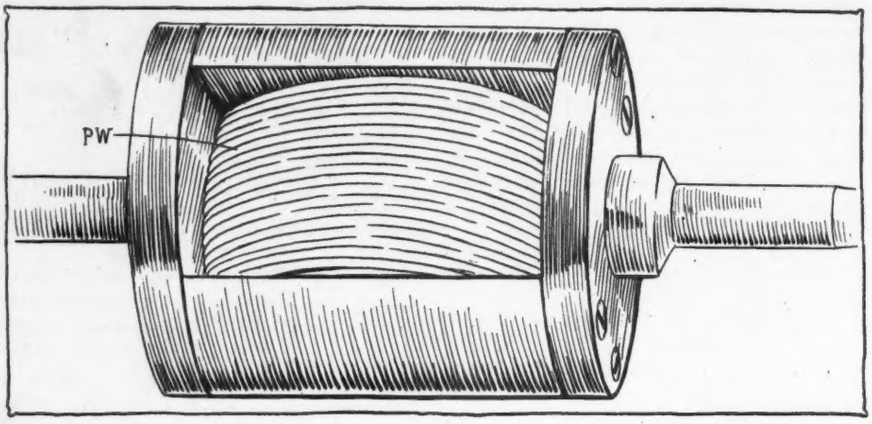
One of the advantages of the floating type of rear-axle has in most cases been the demountability of the driving and differential gears. This year in one of the Halladay models, it is possible after removing the cover of the rear-axle housing, to remove the whole driving and differential mechanism as a unit, the driving pinion, the bevel gear and the differential mechanism being mounted in a specially designed one-piece removable casing.



DRIVING AND DIFFERENTIAL GEAR UNIT AND REINFORCED ADJUSTABLE FAN BRACKET ON HALLADAY.

A Dozen American Firms Now Building Magnetos For

The High-Tension Type with Double Winding on the Armature, Made by the Majority; It Does Not Require an Auxiliary Coil To Raise the Voltage Sufficiently to Bridge the Gap in the Spark Plug. The Low-Tension Type has Large Following in the Trade. Several New Machines Are on the Market



THE ARMATURE OF A LOW-TENSION MAGNETO, SHOWING BUT ONE WINDING PW OF RELATIVELY COARSE INSULATED WIRE. THE ROTATION OF THIS SIMPLE COIL OF WIRE BETWEEN THE MAGNET ENDS GENERATES A LOW-VOLTAGE CURRENT

THERE are eighteen important makes of magnetos from which the American carmaker can select at the present time. In addition to these are half a dozen minor makers who are developing types of their own, but which are not generally used. Of these eighteen makes twelve are products of the American shop and six are importations. The number of American makers has increased perceptibly during the year and there has been a marked improvement in many of the American types.

Before enumerating in detail the changes that have been made in the different magnetos for this year, so that to some extent the trend can be followed, it will be of interest to the amateur reader to know that all magnetos are divided into two great classes; namely, high-tension types and low-tension types. A low-tension magneto differs radically from the high-tension in that there is but one winding of wire on the armature. This is illustrated on this page. This winding is of relatively few turns of coarse wire, which is properly insulated. It is the rotation of this coil of wire cutting the lines of force between the pole pieces of the magnet that generates the current, but this current has not voltage enough to jump across the gap in the spark plug in the combustion chamber.

Transformer Coil Used

To get this extra voltage, what is known as a step-up or transformer coil is used. Roughly speaking, this coil is made up of two windings of wire, one inside of the other and distinctly separate from each other. The current from the magneto armature is led to the inside winding of the coil, and, by opening and closing the primary circuit an induced current of high voltage is set up in the outside winding of the coil. This voltage will be from 1,000 to 10,000 times greater than that of the current in the armature winding, and is of sufficient strength to jump the gap in the spark plug. This, in brief, is a low-tension magneto system.

THE MAGNETO SPARK

In the high-tension magneto system there are two windings of wire on the armature, as illustrated on the next page. The inside winding is of relatively few turns of coarse wire. Outside of and entirely separate from this is what is called the secondary winding, consisting of many thousands of turns of a very fine silk insulated wire. To look at the armature of a high-tension magneto it would be impossible to discover that there are two windings, but in the illustration referred to, the outer winding has been cut away to show the coarse primary winding inside.

Creates Low-Voltage Current

When the armature of a high-tension magneto revolves a low-voltage current is created in the inside, or primary winding; and when the breaker box opens and closes the primary circuit there is induced in the outside, or secondary winding, a high-voltage current of sufficient voltage to jump the gap in the spark plug. This high-voltage current is immediately led through the distributor to the spark plugs, and no external coil mounted on the dash or carried on the framework of the car is needed; in other words, the armature of the high-tension magneto has its two windings and generates a current of sufficient voltage in itself to jump the gap in the spark plug.

It is impossible to classify all of the different manufacturers who build high-tension magnetos and those who build low, because there are many who build both. Of the American manufacturers the following data applies:

Last year the Splitdorf magneto was a low-tension type only, but for this year the company has brought out a high-tension instrument with a double winding on the armatures. The instruments bear striking resemblance to each other, so that viewed externally it would be impossible to state which is the low-tension type and which the high-tension type.

The Remy company builds nothing but low-tension instruments, requiring as they do a step-up transformer coil to bring the voltage to the required strength to bridge the gap in the spark plug.

No Windings on Armature

The K-W Ignition Co. builds both low-tension and high-tension magnetos, having brought out its first high-tension type last year and having already announced an improved model of this for the present season. In this connection it is fitting to note that Remy and K-W magnetos differ basically from practically all others in that they have no wire windings on the armature. The armature of the Remy consists of two crescent-shaped forgings placed diametrically opposite and on opposite halves of the armature shaft. Between these is a stationary winding made up of copper ribbon. On the K-W low-tension instruments the armature shaft carries four metal wings or rotors, two on each half of the shaft, and mounted alternately with the two on the other half. Surrounding the center of the shaft is a stationary ribbon winding. In its high-tension instrument the K-W company supplants the ribbon winding with two entirely separate wire windings corresponding to the two wire

Car Use and Six or Seven Foreign Ones Are in the Field

Two Concerns Build Magnetos With Rotor Armature and Stationary Windings; Two Others Use Single Transformer Coil in Magneto; More Accessibility of Breaker Box and Distributor Mechanism Seen On Every Hand; The Dual Easily is a Leader This Year

windings on the armature of high-tension instrument.

The National magneto is a low-tension type with its single armature winding and requiring a transformer coil. The Briggs magneto is a low-tension type.

The SX, a new American type brought out this year, is a low-tension design, incorporating several features different from those used in many other low-tension types.

The Connecticut magneto in so far as the armature is concerned is a low-tension type, there being but one wire winding on the armature. This company, however, places a transformer coil within the curved space in the magneto. This transformer coil is an integral portion of the instrument and so establishes the right of the company calling its instrument a high-tension type, in spite of the fact that its armature generates but a low-tension current.

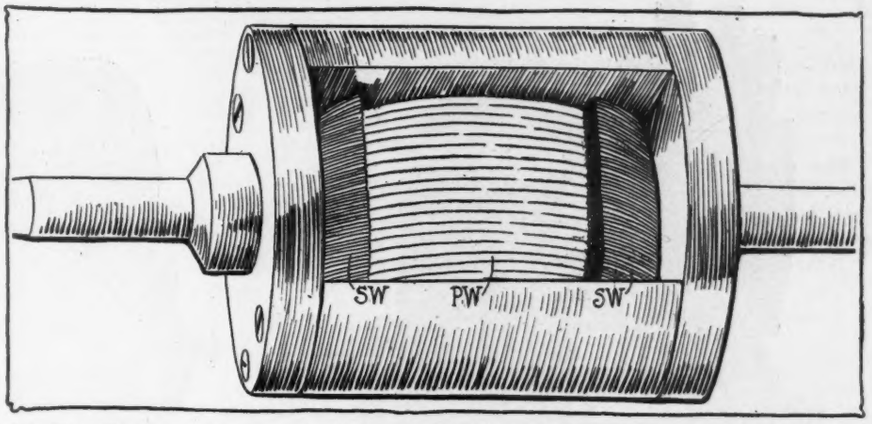
Heinze a Low-Tension

The Heinze magneto is a low-tension instrument carrying but a single winding on the armature, the low-voltage current from which is stepped up, or increased in voltage by a separate coil to the primary and secondary winding, this coil being carried on the dash.

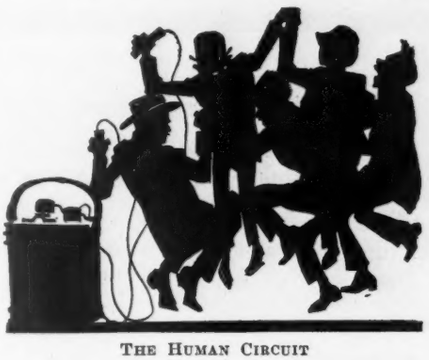
The Herz magneto is a high-tension type, carrying its primary and secondary winding on the armature. The Kokomo magneto is a low-tension instrument for this season.

The Pittsfield magneto is a high-tension type and is in a class by itself because of the fact that both the high-tension and low-tension windings are stationary. Neither of them is located on the armature, but they are mounted vertically at the rear end of the magneto. The armature consists of the two iron wings or crescents which are rotated.

The Pfanstiehl magneto is a high-tension type in the sense that the Connecticut is. It uses but one winding on the armature, which generates a low-voltage current, but within the arch of the magneto is carried a cylindrical transformer coil which raises the voltage. As this coil is an integral unit with the instrument in every respect



THE HIGH-TENSION ARMATURE IN A MAGNETO HAS TWO ENTIRELY SEPARATE ARMATURE WINDINGS. THE INNER ONE PW IS OF FEW TURNS OF COARSE WIRE, AND THE OUTER ONE SW HAS VERY MANY TURNS OF A FINE WIRE COVERED WITH SILK INSULATION



THE HUMAN CIRCUIT

the magneto has an equal right with the Connecticut to be listed as a high-tension.

Of the imported magnetos practically all are of the high-tension type, although many of the foreign concerns build low-tension instruments. The Bosch is made in high-tension types only for jump spark ignition systems. This company, however, manufactures low-tension instruments which are used in conjunction with magnetic spark plugs, as employed on Garford cars, and for make-and-break mechanisms on cars like the Rainier.

The Eisemann magneto, which has been before the American public for a great many years, was until recently manufactured in the low-tension style only, but now a conventional high-tension instrument with a double armature winding has been marketed.

The U. & H. instrument is of the exclusive high-tension type, employing the double-wound shuttle-type armature.

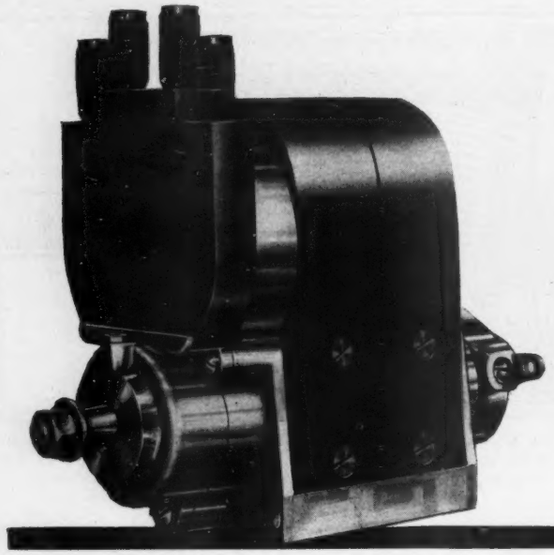
Simms magnetos, used in jump-spark ignition, are of the high-tension design. These instruments are manufactured in low-tension types for make-and-break systems of ignition.

The Mea magneto is a high-tension type with a double-wound armature, but differs radically from other high-tension instruments in that the magnets are bell-shaped instead of the horseshoe type. They are located horizontally.

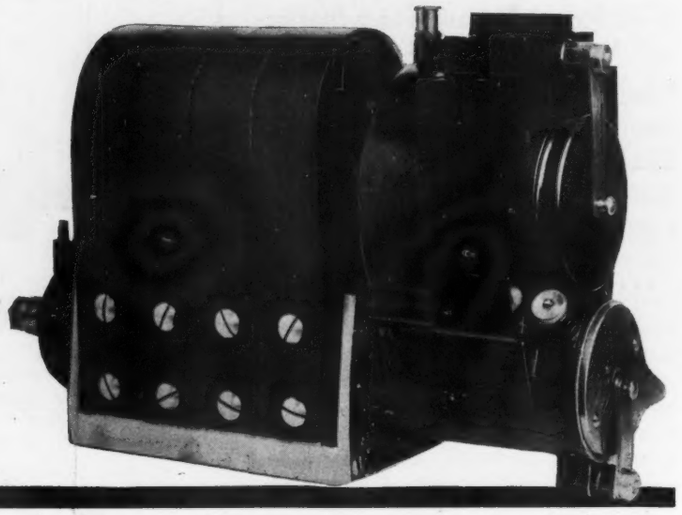
The Swiss magneto is a simplified high-tension type carrying the primary and secondary windings on the revolving armature.

There has been a commendable movement all through with the aim of making magnetos more accessible. It used to be that three or four set screws had to be taken out in order to take the breaker box cover off. Now this is all changed and the cover is secured by a bayonet lock device which can be fastened and unfastened by a simple turn of the hand. Not only has the breaker box cover been improved in this but in many cases the breaker box mechanisms can be moved as rapidly. With the distributor it is simply a case of using a leaf spring or some similar contrivance to hold it in place. Added to these features of accessibility is the facility with which the revolving brush of the distributor can be removed in a second of time. To carry the accessibility feature still further, one or two makers have included provisions for adjusting the breaker box points through a hole in the breaker box so that the adjustment may be made with the motor running. On one or two makes the visible spark gap is used which acts as a telltale and big assistant in discovering where any trouble that takes place is located. In one make there is a locking key which entirely eliminates the necessity of having to look into the breaker box when timing the magneto with the motor. Another make uses a transparent window and a pointer on the revolving distributor disk so that the cylinder which is in the firing position is indicated by the pointer designating the cylinder.

Double-Spark Magnetos, a Feature for This Season's Cars



SWISS HIGH-TENSION MAGNETO



U. & H. DOUBLE-SPARK MAGNETO—NOTE TWO DISTRIBUTORS

The Double-Spark Magneto Uses Two Entirely Separate High-Tension Distributors and Delivers a Spark Simultaneously to Two Spark Plugs in Each Cylinder; More Power Is Obtained in This Way

ONE striking feature of the ignition system this year is the introduction by makers of what is known as the double spark magneto, in that the magneto requires two sets of spark plugs and there is a spark given in each at the same instant. The magneto supplies the current for both sets of plugs, and a battery is not required. This double spark magneto was brought out for racing purposes, in that with the two sets of plugs fired simultaneously a great increase in power was obtained. By actual test it has been demonstrated that the double spark plug system will increase in motor speed as much as 200 revolutions per minute without the spark being advanced in the slightest or an adjustment of the carbureter altered. Tests have also demonstrated that the actual horsepower generated has shown an increase of 40 per cent.

The theory of operation of the double spark is that with a T-head motor, if one plug is over the intake and the other over the exhaust, the flame from the two will meet in the center of the cylinder and thereby give a much quicker ignition than where but one plug is used.

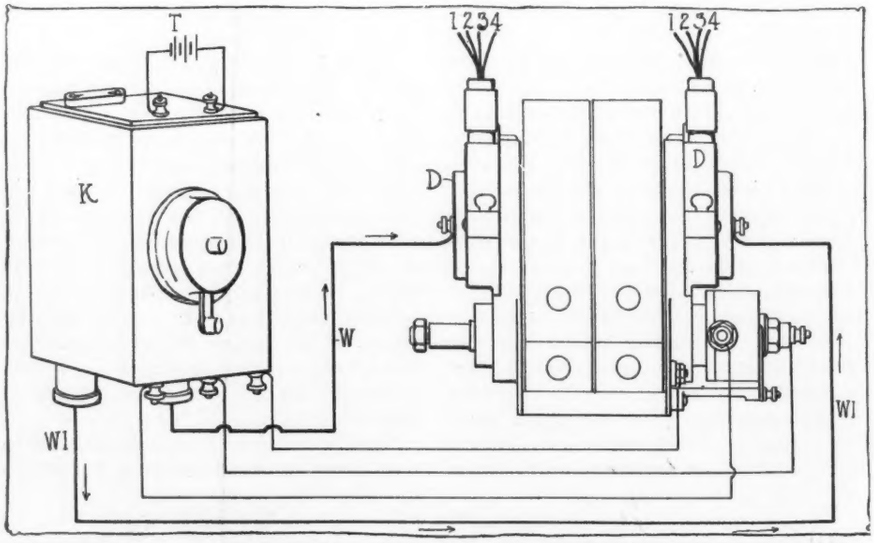
Makers using double ignition sets, that is, a battery current and a magneto current, have used both simultaneously, but have not obtained nearly so high results as where the two sparks are taken from the same magneto. The reason of this is simple. In the double system the two sparks do not occur at the same instant, and consequently the flame does not meet in the center, but the flame from the earlier spark practically does all of the igniting, that from the later spark simply boosting the work of it. If the two sparks in the double system could be ignited at the identical moment, the results would be as satisfactory as in the double spark instrument.

Structurally considered, the double-spark instrument is simple. In the Bosch, for example, the primary and secondary windings on the armature are the same in principle, but a few extra turns of wire are used on each. One end of the secondary is carried to one distributer, and the other end to a second distributer. The two distributer boxes are on the same shaft but entirely insulated from each other. Each distributer delivers its own set of plugs, which plugs are arranged in series.

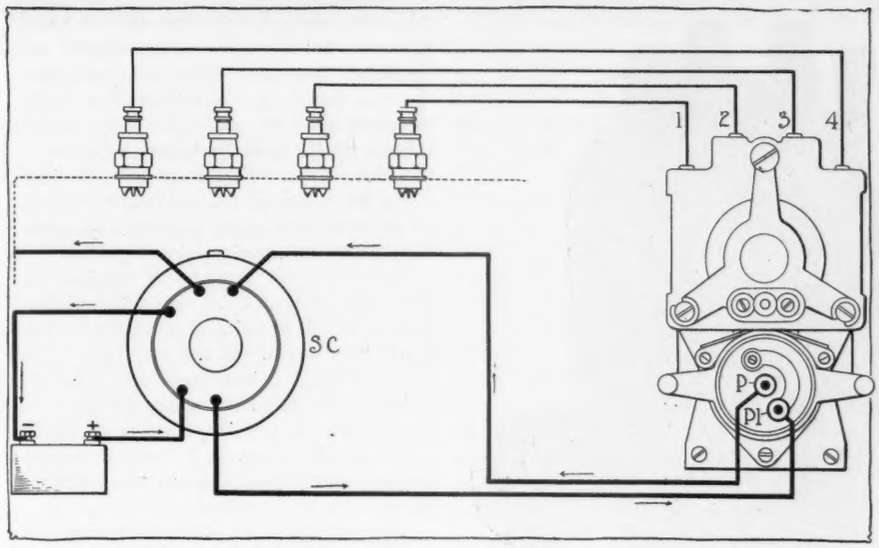
In the U. & H. magneto, for generating a double spark, the armature is made with two distinct windings. In the front half of the armature is a primary with its secondary surrounding it; in the rear half is another primary with its accompanying secondary. Both of the primaries use the same circuit-breaker. One distributer takes its current from one of the secondary windings and the other from the other secondary. In a word, the U. & H. armature is a double armature to all intents and purposes. One of the primary and secondary windings could be burned out and the other would remain in commission. In this instrument the spark plugs are not in series, so that if one plug were to go out of commission it would not affect the other.

Some of the Types

The Splitdorf company has brought out a double-spark type, in which one distributer is mounted at the front end of the magneto and the other at the rear end. A



WIRING DIAGRAM ON SPLITDORF DOUBLE-SPARK MAGNETO. THE PARTS ARE: D, TWO DISTRIBUTORS; 1, 2, 3, 4, SPARK PLUGS CABLES; K, TRANSFORMER COIL; W AND W1 THE TWO HIGH-TENSION LEADS TO DISTRIBUTORS



WIRING DIAGRAM OF SIMMS MOTOR STARTER. THE SIMMS MOTOR STARTER FOR STARTING SENDS THE BATTERY CURRENT THROUGH THE PRIMARY WINDING OF THE ARMATURE AND USES A VIBRATOR COIL SC ON THE DASH TO MAKE AND BREAK THE CIRCUIT

low-tension instrument is used, requiring the assistance of a step-up transformer coil.

The Eisemann double-spark magneto consists of two type ED instruments mounted side by side on a common base and driven by spur gears from a common driveshaft. The instruments are timed alike and controlled simultaneously.

There is much question at present as to whether the double spark magneto will attain any prominence in the stock car field this year. To date but two concerns have signified their intention of making it stock on some of their models. It is undoubtedly true that just as soon as the real merits of the double spark become known that many other concerns will look into the situation. At present some of the double spark types can be sold at about $10 advance on the price of a regular dual type, whereas with others the price is so high as not to be commercial.

The Duplex Ignition System Is Introduced—It Sends the Battery Current Through the Armature Primary Winding To Boost the Current and Gives a Much Hotter Spark at Low Motor Speeds

ONE new feature of the Bosch line for this season is the Duplex, which is different in many respects from the dual. In the Duplex a battery is used and this battery current can be sent through the primary winding of the armature to boost or increase the low-tension current generated by the armature. Final effect of this Duplex system is to build up the magneto current by the addition of the battery current and the spark produced in the secondary system is of more than ordinary intensity and furthermore this hot spark can be produced at relatively low armature speed.

Converter Is Used

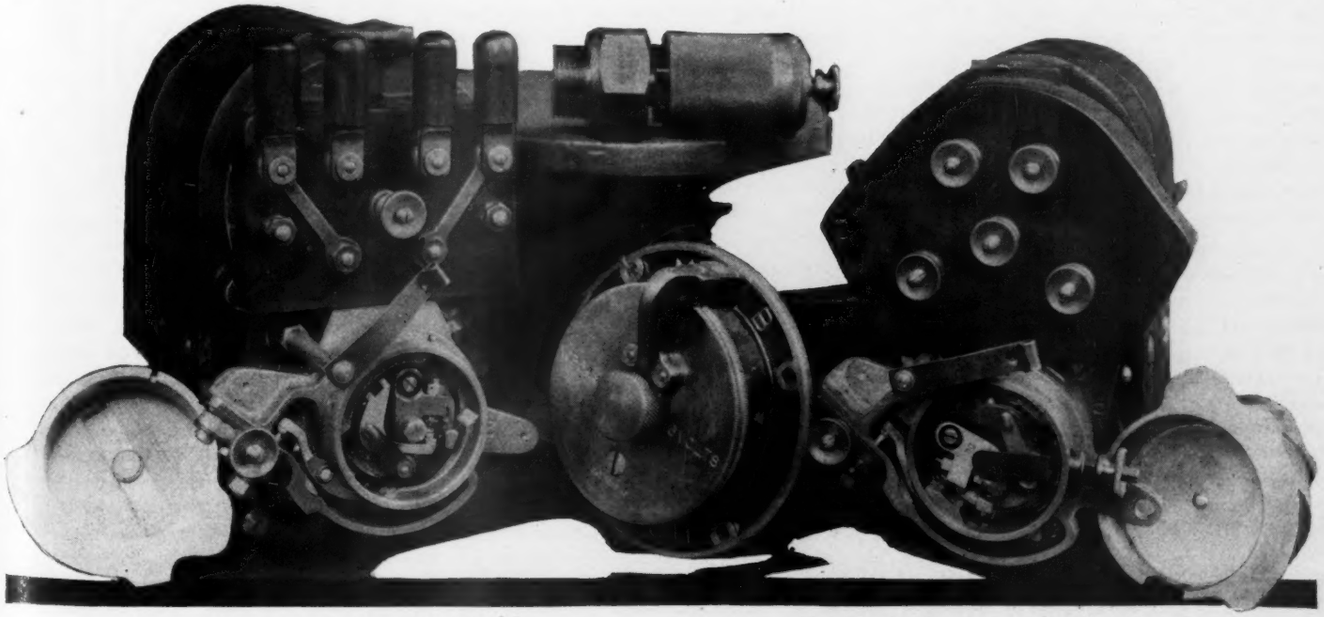
In order to utilize the direct current from the battery on the armature it is necessary to have a converter to change the battery current into an alternating one, which is accomplished by means of a commutator on the inside of the breaker-box cover. By the use of this commutator the direction of the battery current is always the same as the direction of the magneto current, so that the battery current can at all times increase the magneto current.

Both in Parallel

One of the peculiarities of the Duplex system is that the battery and magneto primary are in parallel instead of in series. Because of this it is possible to detach the wires, or even the battery and coil, while the engine is running without slightest interference with the operation of the magneto. It is claimed with the Duplex system that the current consumption from the battery falls off to practically nothing with the starting of the engine; and that as the engine speed increases there is a still further drop in current consumption, even when the switch is left in the battery position; and, lastly, it is claimed that at extreme motor speeds there will be an actual flow of current in the opposite direction—that is, from the magneto to the battery.

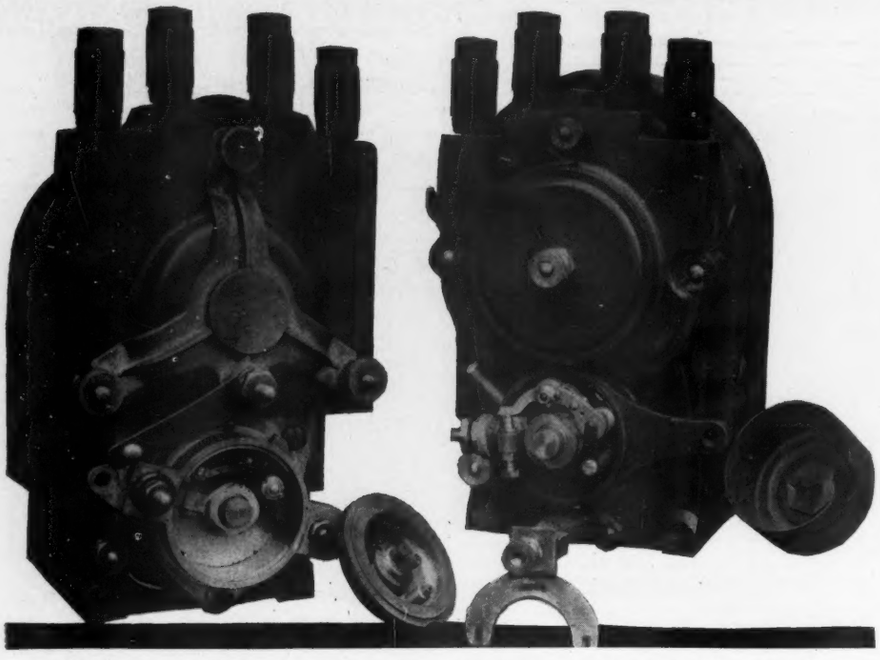
Another Bosch Idea

Another Bosch outfit for this year is what is known as the two-independents. This is a battery and magneto outfit using two sets of plugs and to all intents and purposes is a complete double system excepting in that the two systems come together on the dash, switch and coil. A high-tension magneto delivers its current direct to the plugs, and a battery current is handled through a step-up coil and a combined timer-distributer carried on a motor shaft and driven from the camshaft.



BOSCH MAGNETO FOR MAGNETIC PLUGS

THE BOSCH HIGH-TENSION DUPLEX MAGNETO



TWO 1911 SPLITDORF MAGNETO TYPES. THE HIGH-TENSION SPLITDORF—THE LOW-TENSION SPLITDORF AT THE RIGHT

The circuit-breaker part of this timer-distributer is the same as in a Bosch magneto and the distributer portion is a regulation revolving brush delivering to the four segments.

Simms' Motor Starter

One of the most important systems of the Simms company is what it designates its motor starter. It combines a conventional double-wound armature with a breaker-box mechanism, which, however, is entirely different; and a switch on the dash, which contains primary winding and a vibrator. The coil is very small, being not more than 1¼-inch long, and it contains a condenser within its brass case. In the breaker-box are two extra contact brushes on the armature shaft and they contact with four segments in the breaker-box cover. For starting purposes the current from the battery passes through the primary coil in the switch to the two brushes and from these to the primary winding of the armature. Once in the primary winding the making and breaking of the circuit in the breaker-box induces a high-tension current in the secondary of the armature.

In operation, when the magneto contacts are open and the switch put in the battery position, the battery current excites the switch coil, causing the vibrator to vibrate so that the battery sends an intermittent current to the primary armature winding and the rapid making and breaking of this current by the vibrator induces the high-tension current and the secondary winding of the armature.

The Simms company also has a double ignition set, consisting of a regular high-tension magneto as one set, and the battery, coil and timer-distributer in the other. In addition the company has a standard dual system.

Much interest is taken at present in the Lehman magneto, which furnishes current to the spark plugs so low in voltage that the plug can be cut out by holding the finger against it and yet the person will not experience a shock. This is accomplished by an ingenious arrangement as follows:

Operation of Magneto

The primary winding on the armature is six times that of the ordinary magneto. This primary current is taken off and divided, one-tenth of it going through the breaker box and through a transformer coil, in which the voltage is raised to over 30,000. This current also is transformed from a direct current to an alternating one. This one-tenth of the output of the magneto is sufficient to bridge the gap in the spark plug and forms the pathway, as it were, for the remaining nine-tenths of the current, which has not been raised in voltage, but which is able to flow over the spark plug gap on the arc created by the high-tension circuit.

The one-tenth high-tension current would not ignite the mixture in the cylinder, but will bridge the gap, whereas the nine-tenths low-tension current will ignite the mixture but will not bridge the gap. Consequently the two operating together help each other. The apparent usefulness of a magneto getting this form of current is that the problem of high-tension insulation is reduced to a minimum.

Centrifugal Ball Governor

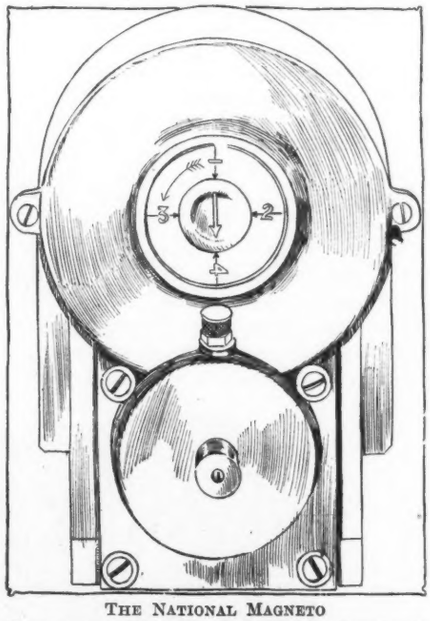
Undoubtedly the greatest novelty in conjunction with the complete outfit of Eisemann magnetos is the centrifugal ball governor which is used, and which is known as the automatic advance. This automatic control of the spark is accomplished by the action of centrifugal force on a pair of governor weights attached at one end to a sleeve, through which extends the armature of the magneto. The weights are hinged at their other ends to the armature. On the armature shaft extending longitudinally are two helicoidal ridges which engage with similarly-shaped keyways in the sleeve. The weights spread with high spark by rotating the armature forward as the armature speed reduces. A spring brings the governor weights together.

Another novel feature in conjunction with the Eisemann is the self-installing feature which permits of anybody attaching it to a motor. In the rear end of the governor housing is a transverse slot into which a key furnished with the magneto fits. When the key is pushed in as far as it can go the armature is fixed in a position, when the platinum contacts begin to open all on No. 1 cylinder.

A novelty in the magneto line is the SX low-tension magneto, which has been designed specially for use on trucks and which magneto differs from the others in that it has not a distributer.

Primary Winding on Armature

It has a primary winding on the armature, and this is raised in voltage by passing two transformer coils instead of one. In the breaker-box there are two sets of platinum points—that is, just double the

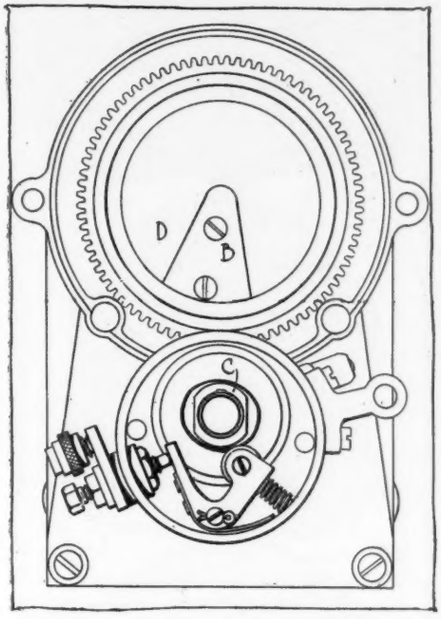


THE NATIONAL MAGNETO DISTRIBUTOR WINDOW—THE ARROW INDICATES THE CYLINDER WHICH IS ON THE FIRING POSTION—THE BREAKER BOX MECHANISM IS ON THE DISTRIBUTOR SHAFT

number used in other magnetos. One set of breaker mechanism is in series with the primary winding in one coil, and the other breaker mechanism in series with the primary in the other coil. The secondary in one coil is in series with the secondary in the other, so that the magneto gives two sparks in each cylinder when only one is used. One spark takes place when the piston is beginning the exhaust stroke and the other the explosion stroke. The apparent object of using the two breaker mechanisms and the two transformer coils

is to get away from using a distributer in the instrument.

The K-W magneto line has been increased with a new model J, which is a high-tension instrument, smaller in size than the high-tension one of last year. This magneto uses a rotor type armature consisting of four metal arms, mounted regularly at 90 degrees on the rotor shaft. Surrounding the center of the shaft is a



BREAKER BOX MECHANISM AND DISTRIBUTOR ON KOKOMO LOW-TENSION MAGNETO

double armature winding. The breaker-box has been improved. It uses a two-point cam, and the breaker points are 20 per cent radio-platinum and can be adjusted through a hole in the breaker-box housing. The two-point cam is tool steel, and a steel roller on one of the breaker-point arms bears against it. This company also manufactures a regular line of low-tension magnetos, in which the rotor armature is used and in which the stationary winding is a single ribbon coil of copper ribbon.

Champion a Low-Tension

The Champion magneto is a low-tension type, the armature carrying but a single primary winding and requiring a step-up transformer coil. The armature is carried on New Departure double race ballbearings. The distributer is a revolving piece of porcelain, rectangular in shape, having imbedded in it a steel spring for distributing the current.

Few changes have been made in the Connecticut magneto for next year. The low-tension armature with its single winding remains the same; the breaker mechanism has not been changed, and the type of magnet remains unaltered. An improvement is that heavier carbon brushes are used in the distributer. These were of round section, but are now square. On this magneto the secondary armature winding is not in place, but a transformer coil is carried within the arch of the magnets.

From a point of view of accessibility, one feature is the slot in the side of the breaker-box housing through which a file can be inserted to clean the platinum contact points. This is a simple detail, yet a very important one. Frequently these points get pitted so that missing occurs, and with this feature it takes but a minute to repair them. Should there be a miss, it affords a quick method of detecting if it occurs at this part of the magneto or not. Further in the matter of accessibility is that the distributer arm may be withdrawn for examination or cleaning by raising the locking lever of the distributer cover. The cup holding the circuit-breaker can be instantly taken from the housing. By means of an adjustment gauge the correct opening of the contact points can be determined while the breaker-cup is withdrawn.

National's Accessibility Feature

In the National magneto of the low-tension type one of the accessibility features, illustrated herewith, is the timing window on the end of the distributer. As the illustration shows, there are four figures, 1, 2, 3 and 4, showing the four contact points to the four cylinders. The revolving arrow, pointing towards the figure 4, indicates that No. 4 cylinder is in the firing position. Where the firing order of motors vary, the Connecticut people furnish timing numbers to correspond for the user's information.

An accessible feature of this magneto is that it is possible to adjust the platinum point in the breaker-box while the motor is running. This has been made possible by cutting away a segment in the wall of the breaker-box housing, through which opening can be inserted a screwdriver to give the required adjustment.

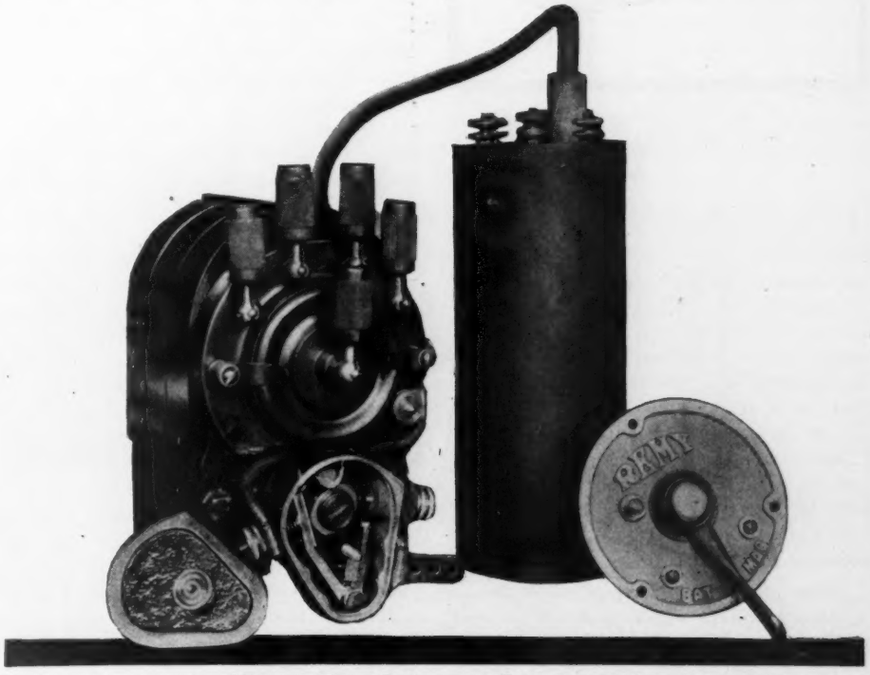
A most interesting detail in conjunction with this magneto is that the breaker-box is located on the distributer shaft and not on the armature shaft. Because the distributer shaft revolves at half the speed of the armature shaft, it is necessary to use a four-point cam for operating the breaker mechanism instead of a two-point one. The utmost care has been taken in building up the distributer to protect against oil and water reaching the wires or the stationary or revolving segment. To accomplish this there is a rubber gasket with a diamond-shaped cross-section, which fits between the distributer cover plate and the body proper. This is used to exclude every possibility of moisture entering. The armature is carried on F. & S. ballbearings and the distributer on plain bronze.

The Pfanstiehl high-tension magneto carries a transformer coil within the arch of the magnets and uses but a single winding on the armature. The windings of the transformer are of the Pfanstiehl's pancake construction, the same as used in the dash coils for several years. The type B magneto may be used as a self-contained dual system. This system complete consists of a magneto and a kick switch with battery. The transformer coil used for the battery is the same as carried in the magneto.

Kokomo a Conventional Design

The Kokomo low-tension magneto is a conventional design having a low-tension winding on the armature, and requiring the use of a transformer coil. The armature is carried on annular ball bearings and the distributershaft on a double race of New Departure bearings.

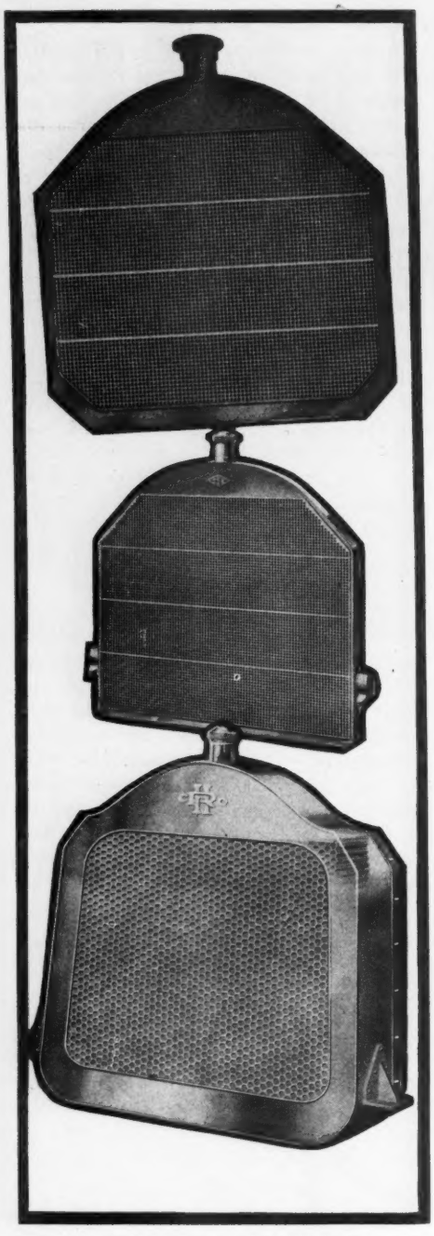
(Continued on page 78)



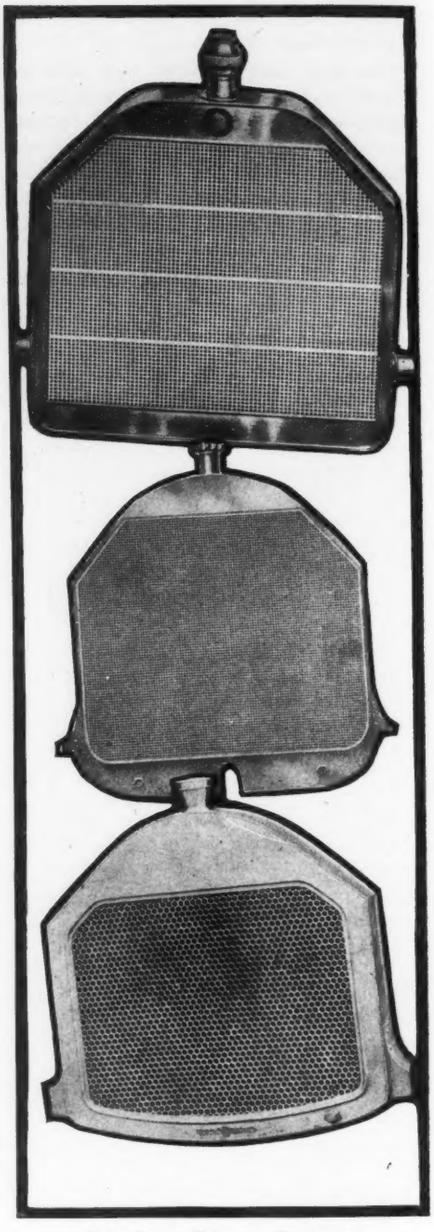
THE REMY LOW-TENSION MAGNETO WITH CYLINDRICAL TRANSFORMER COIL USED TO RAISE THE VOLTAGE. ONE OF THE REMY SWITCHES IS SHOWN

Radiators

WATER-COOLING DEVICES



THE FEDDERS CELLULAR DESIGN
THE A-Z VERTICAL TUBE
THE HARRISON TUBULAR



THE LONG TUBULAR RADIATOR
THE LIVINGSTONE TUBULAR RADIATOR
THE MCCORD ONE-PIECE CELLULAR

THE relative standing of tubular and cellular radiators is best given by an analysis of what the different cars are using. On other pages of this issue are tabulations showing the average car in the $1,000, $1,500, $2,500 and $4,000 field. These tables are compiled for the independent and licensed makers. From these it is evident that the cellular radiator is in greater use with the licensed makers than with the independents. The tubular type leads in lower-priced cars, and as the scale of prices ascends the cellular not only overtakes its rival, but becomes the leader.

There are many examples of imitation cellular radiators which in reality are of the tubular type. This suggests the definition of tubular radiator, which, generally speaking, might be defined as one in which the water flows from the top tank of the radiator to the bottom one through tubes or pipes. Sometimes in the tubular radiators the pipes are horizontal, but the meaning is the same, namely, that the water is carried in one or a series of pipes.

As opposed to tubular is the term cellular, in which the flow of the water from the top to the bottom of the radiator is not confined to separate passages, but can flow horizontally and angularly as well as vertically. In a cellular radiator a portion of water may start from the upper right of the radiator and land at the lower left. Or it may start in the upper center and end at the lower center. A cellular radiator is in reality a complete connection of various passageways which are all in common instead of being divided into definite channels as is a tubular.

McCord Radiators—There are two types of McCord radiators—one a vertical tube design and the other a new one-piece cellular type in which the radiating part is in one piece without joints or soldering. The McCord vertical tube radiator consists of banks of cylindrical vertical tubes connecting between the upper and lower water tanks. The radiation from these tubes is increased by horizontal copper strips extending from side to side of the radiator and contacting with the water tubes.

The McCord cellular radiator has the radiating portion formed by an electrolytic process of depositing copper over a waxed mold. In this way the entire honeycomb radiating portion is a one-piece copper structure without joints or wells. After the copper is deposited the wax is removed by heating. McCord & Co. have purchased the patent rights for the manufacture of this radiator in America.

Fedders Cellular Radiator—The Fedders radiator is a cellular type in that the water does not have to follow any definite passage from the upper to the lower water tank. The radiator is made up of a series of square tubes with a water passage between all adjoining tubes, so that each tube is entirely surrounded by water. The water is free to flow in a vertical passage from the top to the bottom or it can follow a lateral course between the adjacent air tubes. On one type, namely, the square tube design, the air tubes are arranged in vertical and horizontal rows, whereas in the staggered tube design the square air tubes are arranged in horizontal rows, but the vertical water passages are staggered the same as bricks in a wall. Each air tube is a unit in itself. It is a perfect square at each end where it is soldered on four sides to the four adjacent tubes, but the center of the tube is a smaller square, so as to furnish space for the water.

Briscoe Radiator—One of the new Briscoe radiator types for this year is a vertical tube design with an imitation front resembling a square tube Mercedes design.

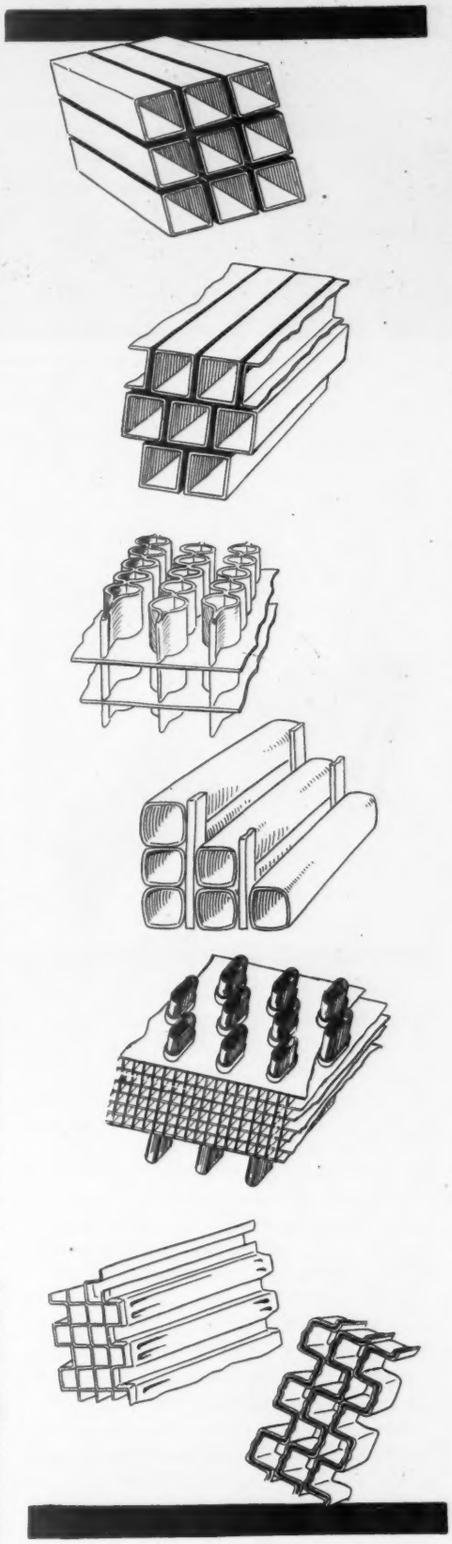
The vertical tubes are oval shaped and arranged in rows from end to end of the radiator, the radiator being three rows deep from front to rear or more. Radiation from these tubes is assisted by a series of horizontal plates fitting closely around the tubes and extending from side to side. This company has improved its square tube type of last year, both in efficiency and in appearance by eliminating the heavy lines. This is done by swelling out the ends of the tubes and so producing a larger water space. All Briscoe radiators are adapted to thermo-syphon cooling.

Harrison Radiator—The Harrison vertical tube radiator has the external appearance of being a honeycomb type. The tubes are made in sets of six or eight extending from front to rear of the radiator, and depending on the radiator thickness. Each group of six is formed by bringing corrugated copper strips together, so that the corrugations harmonize, thereby forming the tubes. These strips are soldered at their outer edges only, and not where they come together between adjacent tubes. This reduces the amount of soldering necessary. These vertical banks of tubes are separated by perforated copper fins, so formed as to give a regular hexagon appearance to the front of the radiator on one type. On the other type they are separated by plain horizontal sheets, giving a square tube appearance to the radiator in front.

A-Z Radiator—The A-Z is a vertical tube radiator, the water flowing from top to bottom through these tubes. There is, however, a horizontal flow between the four horizontal sections which take up the radiator. Were it not for this horizontal flow this radiator could be classed as an out-and-out vertical-tube type. The vertical water channels between the square air tubes are straight from top to bottom, these straight passages allowing of rapid circulation of the water when the motor is running at high speed. The square air tubes are spaced apart, so as to leave room for the water between them, by thin strips of brass, which extend from the top to the bottom of the radiating section. To every square inch of frontal surface there are 64 square inches of radiating surface in a radiator which is 4 inches deep from front to rear. The air tubes are ¼-inch square.

Livingston Zigzag Radiator—The Livingston radiator is a zigzag tubular type, the water flowing from top to bottom through zigzag channels, in which there is as much horizontal as vertical flow. These zigzag tubes extend from the front to the rear of the radiator. The front edges of the metal forming each tube are swaged, thereby giving a sharp front, so that the frontal resistance area of one-sixth of the total frontal area of the radiator.

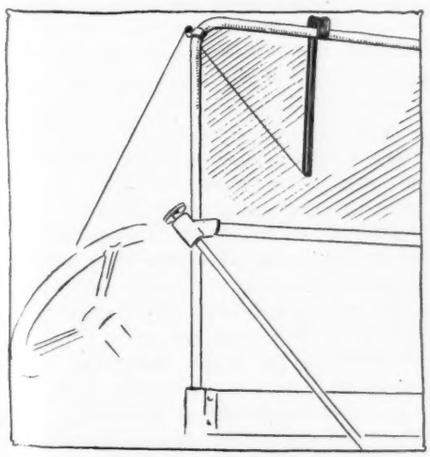
Long Tubular Radiator—The Long radiators are manufactured in a series of tubular types, such as vertical round-tube type, vertical flat-tube type having a diamond-shaped cellular appearance in front, vertical flat-tube type with a square cellular effect in front, and a round-tube pattern with a continuous horizontal corrugated fins. In the square-tube cellular type the water is conveyed from top to bottom through flat vertical tubes with a transverse flow at three divisions which extend horizontally across the radiator. This breaks up the stud tubular effect.



TYPES OF RADIATOR CONSTRUCTION SHOWING TUBE ARRANGEMENTS IN SEVERAL TYPES; ALSO CELLULAR RADIATOR CONSTRUCTION

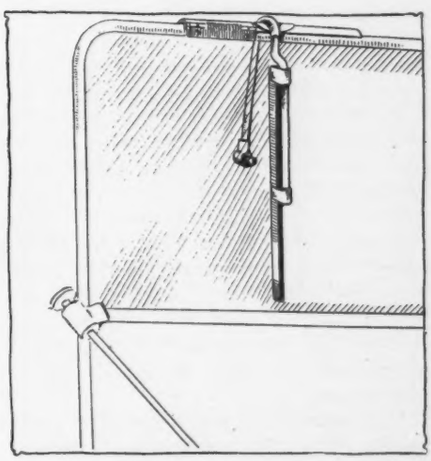
FEDDERS STAGGERED AIR-TUBE
FEDDERS SQUARE AIR-TUBE
HARRISON TUBULAR
THE A-Z VERTICAL-TUBE TYPE
THE BRISCOE VEETICAL TYPE
LIVINGSTON ZIG-ZAG TUBE

Foster Shield Cleaner—A simple windshield cleaner is the Foster, illustrated herewith. It is a rubber blade hinged to a bracket on the top of the wind-shield frame. When not in use the blade is held by a spring up against and parallel with the upper frame piece of the wind shield. To operate the cleaner a wire is attached to the outer end and passing through a swinging sleeve on the corner of the frame. All that is necessary to do is to press sharply on the string and let go.



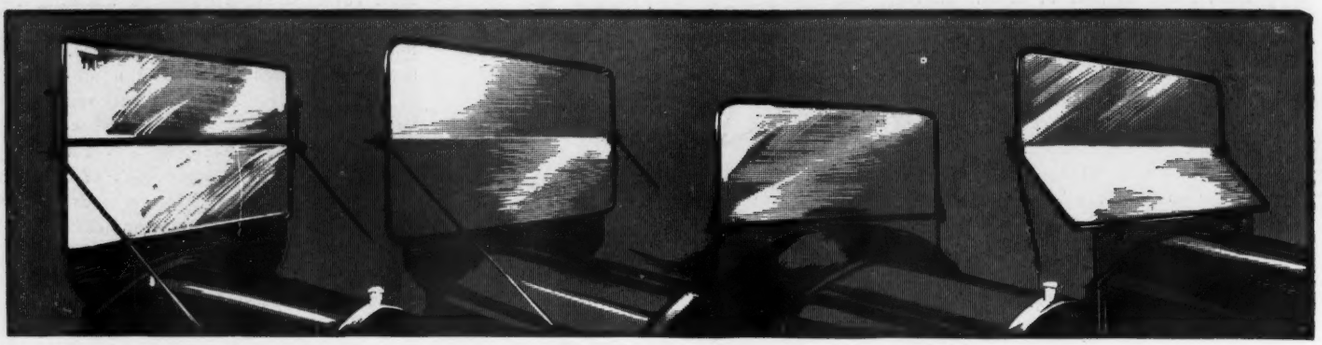
FOSTER WINDSHIELD CLEANER

Security Windshield Cleaner—The Security windshield cleaner is a simple device which can in a moment be clamped onto the top tubular frame of a windshield. The clamp which fits over the tube is made in halves with a spring hinge, so that it is held in place on different tube diameters. The cleaning blade is a rubber one and on the opposite side is a guiding arm to hold it in place. The cleaner is moved from one end of the windshield to the other by hand.



THE SECURITY WINDSHIELD

Windshields Are Now Made Almost Exclusively With



THE VERTICAL THE CLEAR VISION THE TORPEDO THE ZIG-ZAG

THE windshield manufacturers have made progress during the year just closed, and their wares marketed for this season show a decided improvement over many of those listed a year ago. The brass framework is seen on every hand—in fact, at the recent Madison Square Garden show in New York there was not an example of windshield with a wood frame that was pushed to the front. The brass tubular frame is much neater in appearance than the wood and is more up-to-date.

There have been several new types of shields brought out, one of which is the torpedo, illustrated at the top of this page. The torpedo shield is a single-glass design, a low glass being possible because of the heavily hooded dash on the torpedo car and also because of the seats being lower because of the double drop used in the side members of the frame by many car builders. The torpedo is thus the simplest of windshields. In general it is hinged at the base so that it can be swung forward to rest horizontally over the dash.

Clear-Vision Windshields Popular

The clear-vision windshield is more in evidence this year than ever before. This type of shield is shown in the second illustration of the group at the top of this page. It is called the clear-vision shield because there is not a metal strip, or rather two metal strips, across the middle of the shield where the glass is divided. Having no metal at this point leaves a clear vision over the entire shield. It frequently happens that where the metal extends across the shield at this point it comes right in the line of vision between the driver's eye and the point of the road he is watching. Many windshield makers argue against the clear-vision shield on the ground that it is more dangerous because of the glass having no support at this point, and should the glass crack it is certain to fall out of place, whereas with the framework all around the glass cannot fall out, or rarely does.

The typical non-clear vision type, if the term may be used, is illustrated at the top of this page, the type being the first of the group of four in the illustration. It has the two pieces of brass framework extending across the center of the shield.

Advantages of the Zig-Zag

A type of shield that is coming more and more into use is the zig-zag, shown as the fourth in the group already referred to. This shield affords better protection to the driver and other front-seat passenger than the straight type in that the glass is brought well back so the side and cross-air currents are shut out. This shield was originally used on runabouts with the steering columns sloping away back, but

THE HUMAN WINDSHIELD

Types of Windshields

TROY—The Troy shields are made in the automatic type, with the tongue-and-groove hinge. One of these, the Sextette, has six positions, namely, the vertical, rain vision, ventilator, straight ventilator, upper slope and folded. The company has an automatic-zig-zag-sextet which takes all of the same positions. The company has added this year an automatic torpedo with a single glass and which folds horizontally over the bonnet. a

Sprague—The Sprague automatic wind shields employ the radial roller lock. One type, model 26, can be set either as a straight or zig-zag shield. It has the usual folding positions.

Union—On the Union windshields the automatic is a ball lock in which one-half of the hinge carries four balls and four sockets, and on the other half are six shallower sockets for locking purposes. One of the Union types is a clear-vision design, in which all of the positions from straight, rain vision, ventilator, vertical ventilator, sloping, etc., can be used. The company also has zigzag types.

Polson—One of the Polson types, namely, model M, is a straight design in which the upper half can be set for all desired positions, such as rain vision, ventilator, vertical ventilator, sloping, etc. The company furnishes different types of zigzags. The automatic lock on these shields is the ball and socket style.

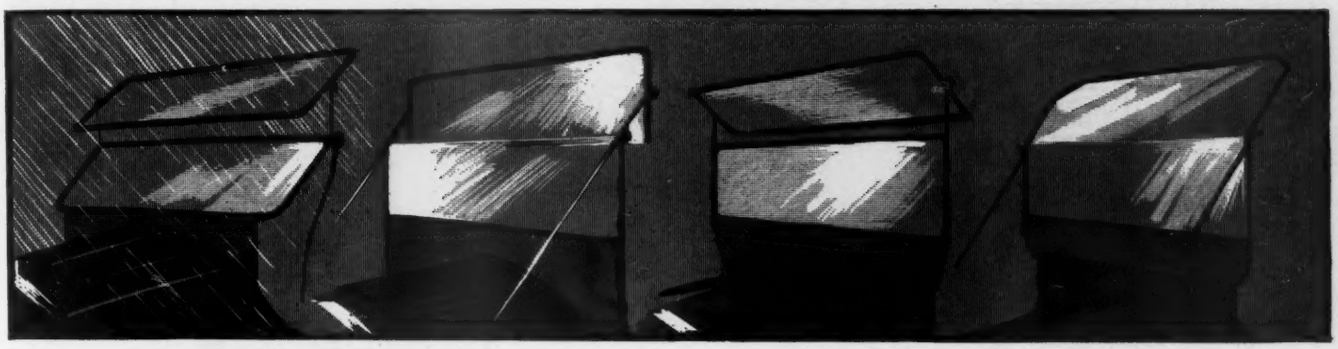
Eagle—The automatic lock on the Eagle windshield is a pawl and ratchet device, the exact details of which Motor Age cannot illustrate. The lock hinges are disks. These disks are supplemented by case-hardened steel pawls and ratches which lock the upper half of the shield in four positions. The shields are made in straight and zigzag types. The zigzag is designed to give the rain vision and other desired positions, as is the vertical.

Mezger—The Mezger automatic windshield is that type using the spring-and-latch fastening control. One of the latest automatics is a friction type in which the upper can be put in any position. In this the friction takes place near the outer edge of the periphery of the disks, and is claimed to be sufficient to lock at any point. This friction device is used in the straight or zigzag designs.

Ajax—The Ajax windshield is made in combination, straight or zigzag. They are of the clear-vision type and can be set in the usual rain vision, ventilated, etc., positions. When desired the lower half can be set horizontally over the dash and the upper half remain vertical, giving a low shield for fast travel. If desired both halves can be folded horizontally.

Rands—In the Rands automatic windshield the lock is a tongue-and-groove type. The hinge disk is attached to the upper half, having two diametrical grooves, whereas the disk on the lower half has a

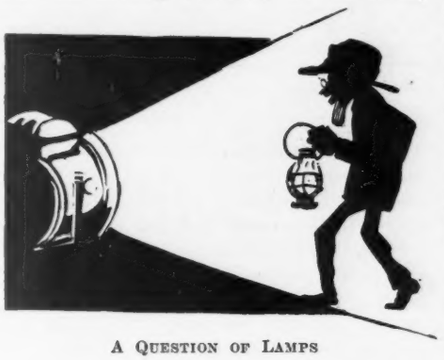
the Automatic Fastener for the Upper Half of Shield



THE RAIN VISION THE VERTICAL VENTILATOR THE VENTILATOR THE UPWARD SLOPE

now it is being used on touring cars, fore-door types and toy tonneau machines. It is made in the clear-vision and non-clear types, and is often manufactured so that the top half not only swings down over the bottom half, but a second hinge at the base of the bottom half allows of both being swung forward over the dash, where they are entirely out of the way.

Roughly speaking, the straight and zigzag types, with the upper half hinged, are the leading varieties, and in some



A QUESTION OF LAMPS

shields there is a total of six or eight different positions. A few of these are shown at the top of this page. One new position is the rain-vision type, in which the upper half is swung forward, leaving an open space between it and the lower half. The upper shield is comparable with an awning in front of a store window, in that it prevents the rain striking on the lower half and leaving this clear for the driver to see.

A second position is the ventilated one in which the upper half is given a reverse position to that in the rain vision. It slopes rearward and downward, thereby directing the air currents direct on to the driver.

The Vertical Ventilator

A third position is the vertical ventilator, in which the upper half is swung to the rear, but the pane of glass kept vertically. This does not give as violent ventilation as the one mentioned in the preceding paragraph, but allows of a free air current back against the driver. Both the full ventilated and the vertical ventilated will be valuable types of shields for fore-door bodies, in which it is recognized that some special type of ventilation is needed.

The fourth position for the upper half is the sloping, in which the upper half inclines upwards and rearwards. The object of this is to reduce the windage. This position is only used for fast traveling.

The automatic shield is more in evidence than ever. It seems to be now a settled fact that there is no necessity for having to use thumb screws, wing nuts or other devices when it is desired to change the position of the upper half of the windshield. The arguments that were heard against the automatic a year ago rarely are heard today, and the automatic is as accepted an arrangement as is the pressed steel frame on a car. There are many different types of automatics which are mentioned separately in the following paragraphs without reference to the different manufacturers who use them.

Perhaps the first type of automatic to comes out was the friction disk. It is identical with a multiple-disk clutch, or

On American Market

series of corresponding diametric tongues or ridges. The Rand shields are made in straight and zigzag types. Model 14 Strazig can be used either as a straight or zigzag and with clear vision or otherwise. If desired both halves can be folded horizontally over the bonnet. This company manufactures a special rain-vision type.

Newark—The Newark windshield is made in three models, including a clear-vision type. The upper half of all models may be placed in any position automatically.

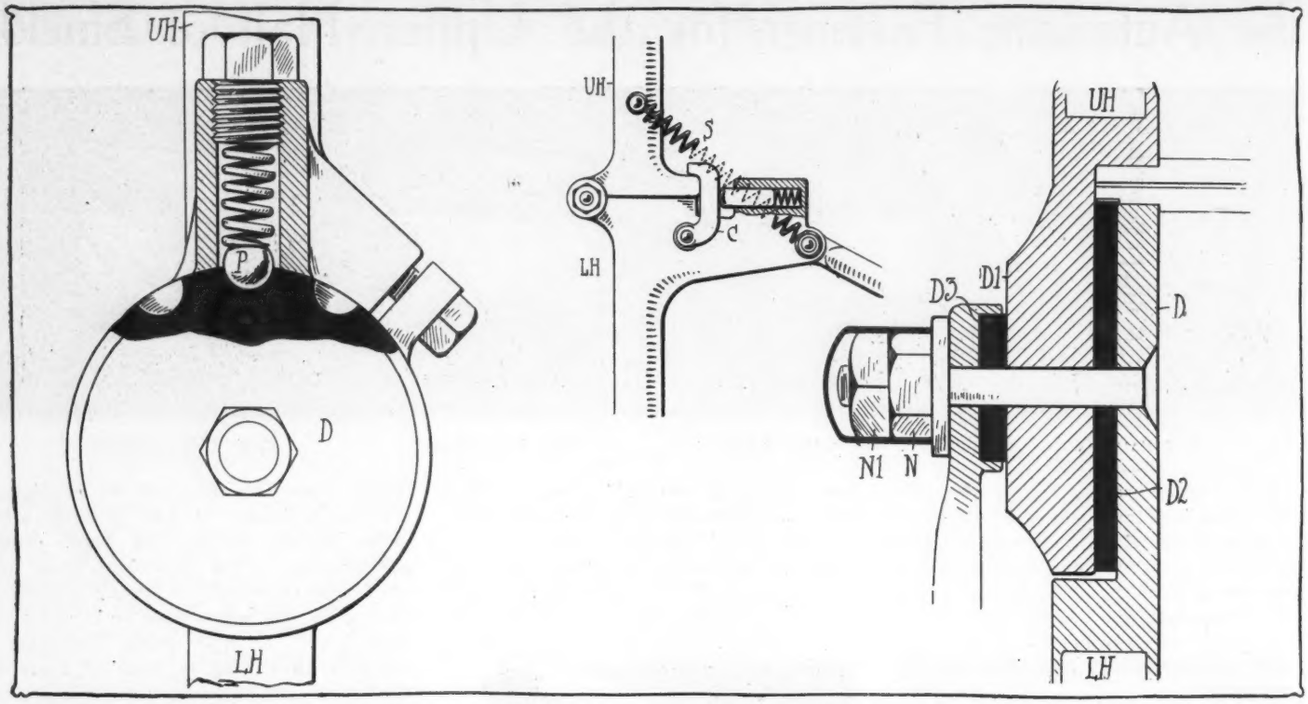
Vanguard—The Vanguard windshield is of the ball-lock type and made in vertical and zigzag styles. Model 19, a vertical design, has three positions, namely, vertical, folded and upper slope. The model 23 zigzag has the lower half hinged so that its degree of slope can be varied in order to bring the upper half of the shield up against the top in rainy weather. A new shield can be used either as the straight or zigzag. The lower hinge disk has six countersunk holes near its periphery to receive a countersunk hardened steel disk. The rotary hinge has three holes containing steel balls.

Milwaukee—On the Milwaukee adjustable windshield the automatic lock is not used. The hinge is a ball-and-socket type with a wing nut to hold the hinge together. These shields are built in the straight clear-vision type, zigzag clear-vision, and the same styles without the clear-vision feature. With the friction hinge the upper half can be set to any desired position.

Cox—The Cox windshield is made in the usual straight and zigzag types, with and without the clear-vision feature. The automatic hinge used is the plunger ball variety. One of the disks of the hinge carries peripheral sockets into which the ball enters. The ball is carried in a short tube with spring behind it. This tube is external of the hinge instead of being incorporated in it, as in some plunger-ball types.

Challenge—The Challenge windshield uses an automatic hinge, consisting of four plunger balls carried within one of the hinged disks. The corresponding half of the hinge is a cup with many hemispherical sockets into which the balls are forced. The Challenge shield can be used either as a vertical or zigzag. It is of the clear-vision type and is adaptable to the rain-vision, ventilator and other positions.

Auto—A new type of windshield which has made its appearance might be called the torpedo style. It is manufactured in practically one type. The shield is more like a boot which fits closely around the dash and curves rearward and upward to the front of and a little higher than the steering wheel. The curved front surface deflects the wind upward above the driver's head. The top of the shield is so low that in some cases the driver watches the road above it. The Auto windshield and the Ideal are two examples of this type. Celluloid panels are used.



THE VANGUARD PLUNGER BALL AUTOMATIC WINDSHIELD LOCK—LH, LOWER HALF OF WINDSHIELD FRAME; UH, UPPER HALF OF FRAME; P, BALL PLUNGER, AND D, DISK WITH SOCKETS TO RECEIVE THE BALL

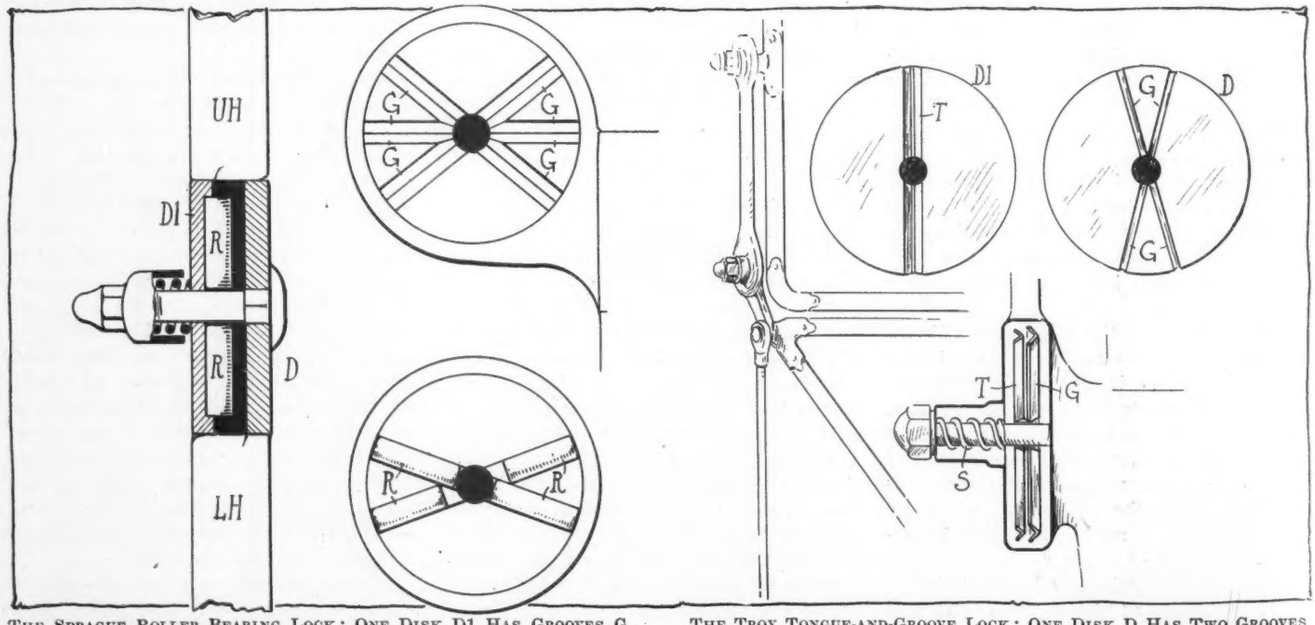
THE MEZGER LATCH AND SPRING AUTOMATIC LOCK; C IS THE LATCH AND S IS THE SPRING. IN THIS AUTOMATIC THERE ARE BUT TWO POSITIONS, VERTICAL AND THE DOWN POSITIONS; THE SPRING HOLDS IN BOTH

THE FRICTION DISK AUTOMATIC, D2 BEING A LEATHER DISK BETWEEN THE METAL DISKS D1 AND D2; N AND N1 ARE NUT AND LOCK NUT TO CHANGE THE AMOUNT OF FRICTION BETWEEN THE THREE DISKS

a disk shock absorber, excepting in that there are only three disks employed, two metal ones outside with a leather, fiber, wood or other inside. The two outer disks are the hinged parts, formed integrally with the upper and lower halves of the framework. The leather or wood disk is placed between these. A stiff coil spring surrounds the hinge bolt and presses the disks together. There is a wing nut on the end of the hinge bolt by which the friction between the disks can be increased. With this type of automatic hinge it is simply necessary to pull the upper half of the shield into the position desired, the friction being sufficient to retain it.

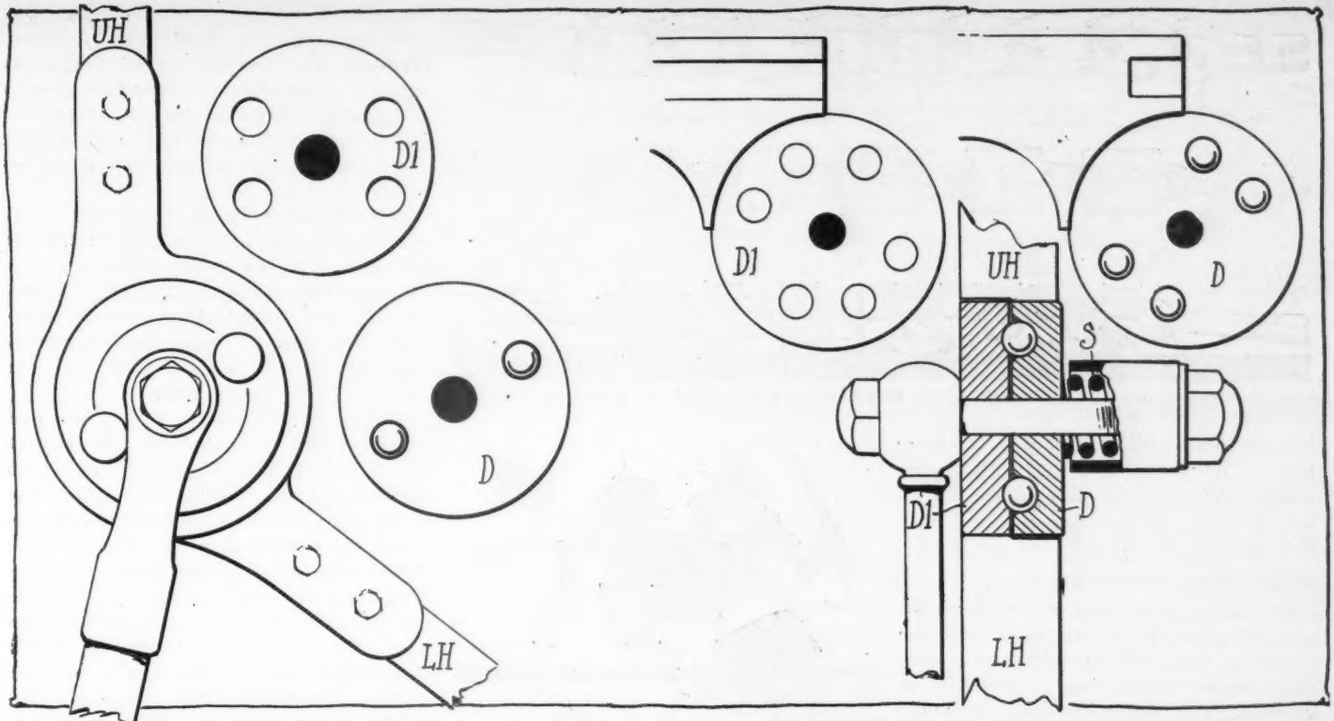
Some Automatic Types

A second type is the locking ball—automatic. In this the hinge part attached to the upper and lower halves of the windshield is in the form of a thick metal disk, the two coming face to face. In their opposing faces are series of hemispherical sockets. One disk will have four sockets, the other six. Steel balls are placed in each of the four sockets of one disk. These sockets are deeper than those in the opposite disk. The shield will lock in any position when the steel balls rest in a complete ball opening formed by the facing socket in the disk. In this position a stiff spring forces the disks together. To change to any other position a pull on the upper half of the shield is sufficient to force the balls out of the shallower sockets and carry them around in that part of the hinge with the deep sockets. In doing this the tension of the spring is overcome. As soon as another of the shallow sockets is reached the spring tension forces the balls in and the shield is locked in another posi-



THE SPRAGUE ROLLER BEARING LOCK; ONE DISK D1 HAS GROOVES G AND THE OTHER DISK D CARRIES ROLLERS R IN SHALLOW GROOVES. A SPRING HOLDS THE DISKS TOGETHER

THE TROY TONGUE-AND-GROOVE LOCK; ONE DISK D HAS TWO GROOVES G AND THE OPPOSING DISK TONGUES OR RIDGES T. A SPRING S PRESSES THE DISKS FIRMLY TOGETHER



THE ZIG-ZAG BALL-AND-SOCKET WINDSHIELD LOCK; THE DISK D CARRIES BUT TWO BALLS IN DEEP SOCKETS. THE DISK D1 HAS FOUR SOCKETS FOR LOCKING POSITIONS

THE UNION BALL-AND-SOCKET WINDSHIELD LOCK; FOUR BALLS ARE CARRIED IN THE DISK D AND THEY LOCK BY RESTING HALF IN THESE HOLES AND HALF IN HOLES IN DISK D1

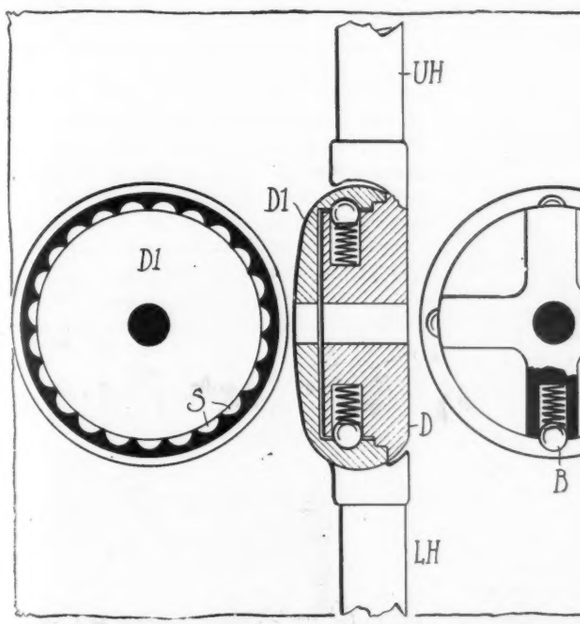
tion. By using four sockets in one-half of the hinge and six in another, and by arranging these holes at different positions, any desired lock position can be obtained.

In some type of ball-and-socket lock only four sockets are used in one-half of the hinge and two in the other. In this case but two balls are used, where as four are employed in the type mentioned in the preceding paragraph.

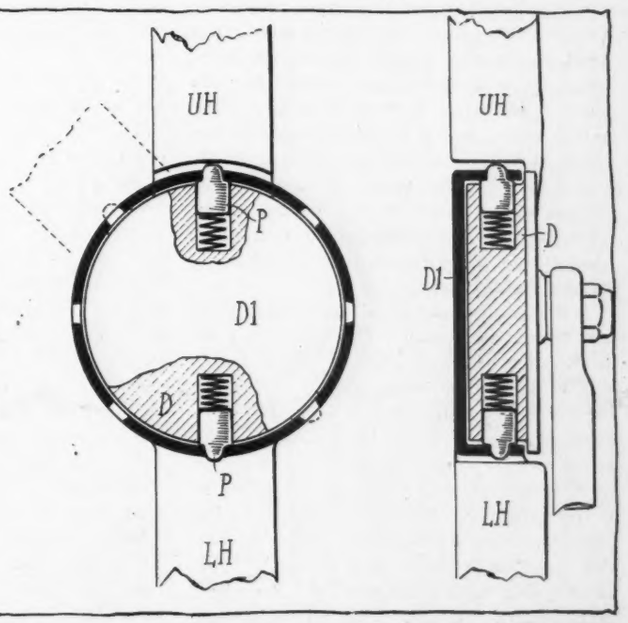
The Plunger Type

A type of lock which bears a striking resemblance to the ball and socket is the plunger type. In this the hinge on the upper half of the frame is a thick disk, in which are diametrically mounted two plungers located in sockets in the disks and pressed outward by springs. The hinge on the lower half of the shield is cup-shaped to receive the disk. In the periphery of the cup are eight sockets into which the end of the plunger can enter. The shield locks in any position in which the plungers enter these sockets, the sockets being arranged so that the two plungers are always in sockets at the same time. By distributing eight sockets around the cup disk there is a possibility of four different positions forward and four different positions backward for the upper half of the shield. The outer ends of the plunger are rounded so that in changing from one position to another the quick jerk on the upper half will force the plungers out of the sockets.

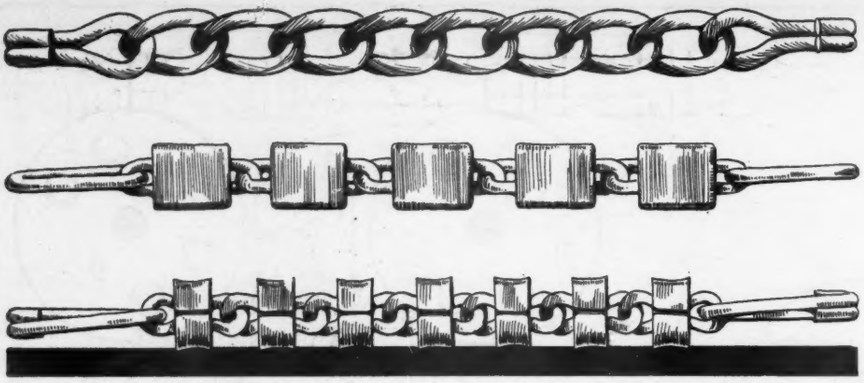
A type of automatic lock, closely associated to the plunger, is the spring and ball, in which four balls, regularly spaced at 90 degrees around the circle, take the place of the two plungers referred to. These four balls are carried in sockets in the disk, forming half the hinge. They



THE CHALLENGE BALL-AND-SOCKET LOCK; THE DISK D CARRIES TWO BALLS THAT ENTER THE SOCKETS S IN THE CUP D1 TO LOCK THE SHIELD



THE DOUBLE PLUNGER LOCK; THE PLUNGER P ARE CARRIED IN THE DISK D, AND THEY LOCK BY ENTERING SOCKETS IN THE DISK D1



CROSS CHAINS—FROM TOP DOWN, WEED, RELIANCE, FEGLEY

are forced outward by springs. The other half of the hinge is a cup with a continuous series of hemispherical receptacles for the balls. This spring can be locked in a great number of different positions.

Radial Roller Lock Features

The radial roller lock is used by some companies. In this the halves of the hinge are disks. One disk is a solid brass casting and carries three diametrical slots or grooves. The other disk is a brass cap with a bronze disk riveted and braced into it. In this bronze disk are two diametrical slots in which are carried solid hardened steel rollers. The rollers are free to revolve in these disks. When the hinges are assembled the shield will lock in any position when the slots on one disk are opposite the slots on another so that the steel rollers will rest part in one disk and part in the other. A stiff spring surrounding one end of the hinge bolt holds the disks firmly together. There is an adjusting cap by which the tension of the spring can be varied.

The Tongue and Groove Type

Still another automatic lock, and one which bears a striking resemblance to the radial roller type, is the tongue and groove. Like all the others, the hinges are in the form of opposing disks. One of the disks has a series of diametrical grooves and the other a series of diametrical ridges. The shield locks in any position in which the ridge or tongue enters the groove. It is identical with the roller type, excepting instead of the rollers there are the grooves. The disks are held together by a crucible steel spring. The disks are hardened steel.

Spring Catch Cock

Still another variety of the automatic is the spring and catch. The lower half of the framework has a short hinge latch, which engages or hooks over a projection on the upper half when it is in the vertical position. There is a long spiral spring which assists in holding the upper half vertically, and back of the latch is a spring plunger holding the latch in its position. This arrangement allows of but one position, namely, the vertical. The main spring holds the upper half firm when in the down position. This allows of but two positions, namely, up and down, the spring holding the sash in either.

Anti-Skid Devices

THERE is particular activity shown this year in the matter of anti-skid devices for chains. The majority of these are based on the principle of permitting circumferential creep; that is, the chain which encircles the tire is not anchored rigidly to the rim of the wheel, the felloe or the spokes, but the chain is free to creep slightly on the tire. This has the advantage of constantly changing the position on the cross chains on the tire and so preserving the tire. Another advantage of the circumferential creep is that when starting the tire can start faster than the chain. Owing to the friction of the chains on the ground, were it to start rotating as rapidly as the tire there would be disastrous results at times.

Six or Seven Different Chains

There are upwards of six or seven different chains on the market. The Weed uses a curved link cross chain; on the Zigzag practically the same type of cross chain is used; on the Reliance metal bands are strapped over the chain links; the metal band is also used on the links of the Fegley; on the Atlas special links, some forgings, and some stampings are used; and on the Kant-skids but three links are used, the center one being a steel stamping with smooth rounded surface to the tire and a gripping surface exposed to the load. This main link extends across the entire tread and to its ends are ordinary steel hook links for connecting with the circumferential chains. The Kant-skid chain can be anchored to the wheel felloe.

On the Weed chain the ordinary type of cross chain is used and the circumferential chains have the usual clasp fasteners. A useful device to be used in conjunction with Weed chains is the equalizer spring, which consists of four radially placed springs that sit outside of the wheel spokes. At their centers they connect with a common chain part that surrounds the wheel hub, and at the outer ends hook onto the circumferential chains at 90 degrees.

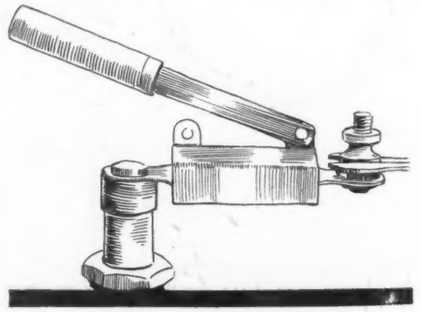
Of the Staggered Type

On the Zigzag chains the feature is that the chains which cross the tire do not cross at right angles, but at an angle of 45 degrees, being staggered first in one direction and then in the opposite direction. The cross chains on the Zigzag are of the standard curved link type.

Fegley Non Skid—The Fegley is a conventional type of anti-skid tire chain with an improved style of cross chain. Each link of the cross chain has a steel band stamped around it. These steel bands prevent the link cutting into the tire and increase the wear of the chain. The cross links attach to the circumferential chain by a double steel hook, which snaps into one link of the circumferential. With this double hook a cross chain can be replaced without the use of a tool. The circumferential chain-fastener is a hinged clamp with three positions for the link. Should this adjustment not prove sufficient the end link of the circumferential is the double hook type as used on the cross chain, and can be taken from the end link of the circumferential and snapped into the second or third from the end according to the requirement. Linkages furnishes to anchor the circumferential chain to one of the spokes for use in snow.

Reliance Tire Chain—The Reliance anti-skid tire chain uses cross chains in which each link has a case-hardened flat band around it which prevents the link from cutting the tire. Due to the use of these bands the chain is reversible, so that when one side is worn the other can be turned outward to wear against the road surface. The circumferential chain is self-adjusting because of a coil spring which forms the end link of it and to which hooks one end of the long S-shaped hook, which is the locking feature. This hook at its free end hooks itself into a small locking ring carried on one of the links of the circumferential chain.

Atlas Tire Chains—The Atlas anti-skid tire chain uses a novel cross chain in which the center link is a drop forging and the adjoining two links on each side



THE H. S. M. SWITCH

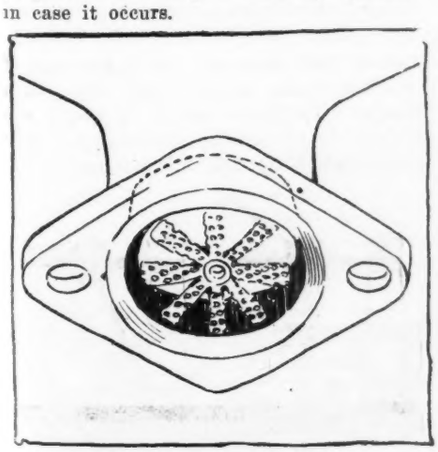
are steel stampings. The object of using a high carbon steel forged center link, which is heat-treated, is to give increased mileage. It has a corrugated surface bearing on the road and a plain surface bearing on the tire. Ordinary hook-shaped steel links are used to connect cross link to the circumferential chain.

A novel fastener is used for the circumferential chain. It is a curved lever with a hook on each end. One end of the chain fulcrums to a bend in the lever and the other end hooks into the short arm of the lever. On the long arm is a side hook which is anchored into the chain link. By this lever arrangement a take-up of 1⅝-inch in the chain length is possible.

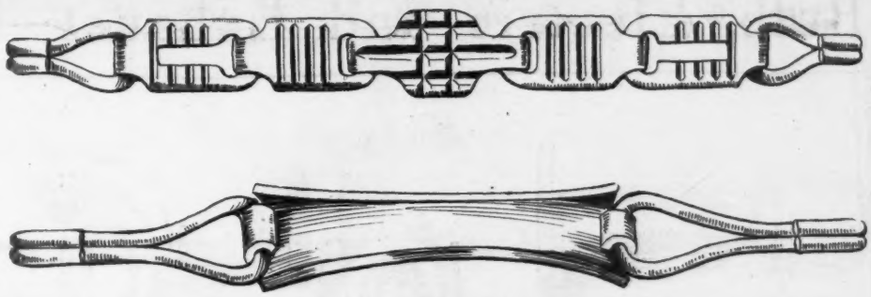
Gyrex Gasoline Mixer—The Gyrex mixer is an eight-blade fan, the perforated blades being made of German steel and hardened by an electric process. This fan or turbine is carried on ball bearings in a tubular flanged shell which can be inserted into the intake manifold. As the motor draws the mixture from the carbureter the turbine is rapidly revolved and helps to break up the gasoline globules. By having the shell carrying the turbine flanged it can be readily fitted in the manifold at the flange end where the carbureter attaches.

The A-C Spark Plug—The A-C Spark Plug of the Champion Co. differs from the conventional plug in that it uses a floating porcelain insulation, in which it is claimed that the porcelain is entirely freed from strains. The regular plug casing screws into the cylinder head, and has a circular shoulder on which rests a flange on a copper sieve that surrounds the porcelain. A spanner nut clamps the flange upon the socket shoulder. Owing to the flexibility of the flange any strains that might be set up in the plug socket are not transmitted to the porcelain insulation.

H. S. M. Switch—The H. S. M. Auto Switch Co. manufactures the H. S. M. switch, which is intended to be attached between the spark plug terminal and the end of the ignition cable. It is simply a knife switch, provided for the purpose of quickly breaking connections between the high-tension lead and the plug, for the purpose of locating a misfiring cylinder in case it occurs.



THE GYREX GASOLINE MIXER



THE ATLAS CROSS CHAIN ABOVE AND THE KANT-SKID UNDERNEATH

Some Shock Absorbers

SHOCK absorbers are manufactured in four leading types, as follows: The friction disk, with which may be combined the friction cup; the pneumatic type; the hydraulic type, and the combination spring types. In the friction shock absorber the vibration is taken up by friction between metal, or metal and leather, or metal and wood parts. In the hydraulic different liquids are used as the absorbing mediums in that they are employed to control the movement of pistons acting in cylinders. In the pneumatic type an air cushion is employed. There are several combination spring types in which different forms of springs are utilized.

The Foster shock absorber is continued in its 1910 form, but a larger size has been brought out with a drum 3⅜ inches in diameter and with 1½-inch face. Owing to the larger size, the adjustment has been changed from the front side to the rear in order to make it possible to secure stampings adequate for this work. The principle of the Foster is that of an elliptic drum on the frame with its long diameter vertical. An elliptic band, connected with the axle, surrounds the drum. The friction of the band against the drum is the absorbing medium. The absorber allows of a practical free movement in the neutral zone of the spring; that is, when the spring is riding normally.

The Hartford shock absorber is continued as used last year. It is of the friction disk type, there being a specially prepared central disk located between the two steel disks which carry the arms of the absorber. The tension between the disks can be varied, an indicator pointer being used on the regular types for this work. The company also builds the Juniorette, suitable for small cars. It is identical with the larger shock absorber, excepting the dial and indicator have been left off.

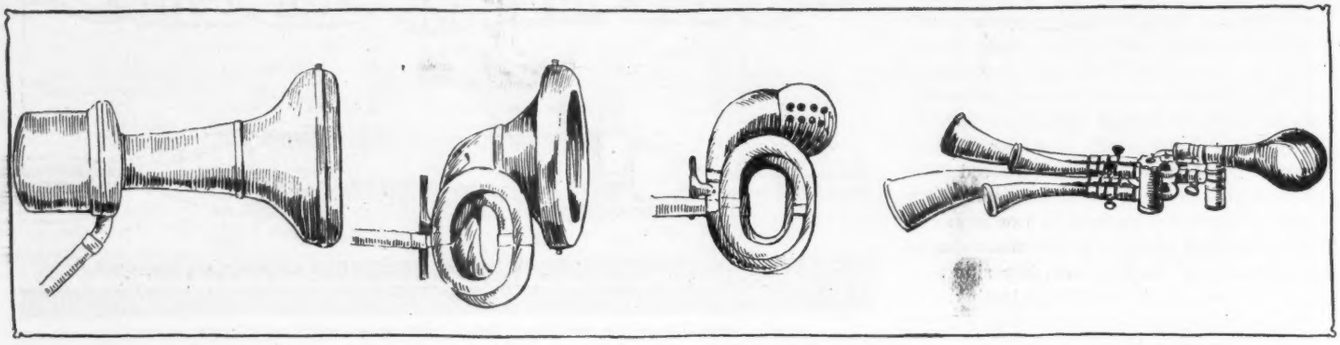
In the Kilgore shock absorber the absorbing medium is an air body. The design is a plunger type in which the movement of the plunger is controlled by the restricted openings through which the air is compelled to pass from one side of the plunger to the other.

Flentje Shock Absorber—The Flentje absorber is a hydraulic shock absorber in which a glycerine mixture is the fluid used. The absorber is a vertical cylinder in which moves a piston. On the up stroke of the piston the glycerine passes through but three holes in the piston, so that its movement is relatively slow and what might be called the rebound of the spring restricted as much as possible. On the down stroke of the piston seven holes are open to let the glycerine pass through.

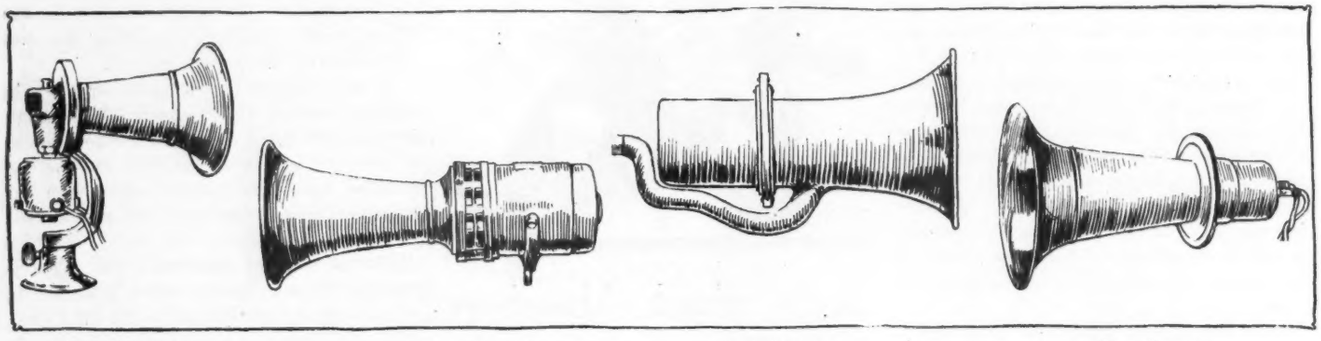
This absorber is set to check at a 20 per cent rate on the down motion of the plunger and 80 per cent on the upward or recoil movement. The plunger has a hollow stem and in which stem is one of the seven holes through which the glycerine mixture can pass. This hole opening is regulated by a sleeve inside the plunger rod. By raising or lowering this sleeve the opening is increased or diminished. This is the means of adjustment furnished. With this hole practically closed a stiff action is secured. With it open a freedom of movement is allowed. The shock absorber has been improved by the addition of a new stuffing box in the top through which the plunger rod works.

Westen Shock Absorber—The Westen shock absorber obtains its friction by placing two specially prepared maple wood disks 2¾ inches in diameter and 3-16-inch thick in contact with a steel stamping, there being a wood disk at each side of the stamping. The disks are carried in the hub part of one arm of the shock absorber and the steel stamping is the hub portion of the other arm. There is a compound friction element in the form of a three-toothed cam which floats within the steel stamping referred to. This cam is not a tight fit within the stamping, but allows of the arm, which carries the stamping, moving

Bulb, Electric and Exhaust Types of Signals



THE CROSS BULB HORN THE NONPAREIL BELL THE NONPAREIL BALL END THE TESTOPHONE



THE KLAXON THE SIRENO THE SPARKS THE JONES

slightly up and down before carrying the cam around with it. By this contrivance all normal spring action is unrestricted, but as soon as the spring action becomes great enough to move the cam then the real friction between the wood disks and the cam is taken up. In this way, no matter how heavily the car is loaded, the cam will come to the normal position and the immediate range of spring flexion can be accomplished without moving the cam. This cam in reality serves as an automatic adjuster to varying load conditions and allows of unrestricted free normal movement of the spring. This freedom of movement in the neutral zone of the spring is reached by the cam turning the necessary part of a rotation with the shock absorber arm.

Connecticut Shock Absorber—The Connecticut shock absorber is a three-cam-three-spring combination as opposed to the friction-disk type. One of the shock-absorber arms carries on its axis three cams placed at 120 degrees around a circle. The other has a hub-like compartment in which are placed three sets of springs in the form of a triangle, the space within the triangle being occupied by the cam. Each spring is composed of three flat leaves and between the spring and the cam is a bronze plate. With the spring in normal position the cams face the angles in the triangle, and as the spring acts the cams bear against the bronze plates forcing the springs outward. The case containing the spring and cams is filled with lubricant.

THE usual line of signals for motor cars has been augmented during the past year. The electric horn has gained in followers and there are many other types such as those operated from the exhaust, as well as the bulb type. Some new types have been brought out in which the electric is combined with the bulb.

The Klaxon horn is an electric diaphragm type. The metal diaphragm has a steel button riveted in its center. Against this button strike the arms of a star wheel, which is rapidly rotated by an electric motor. The electric motor is part of the horn. The current is taken from dry cells or storage battery.

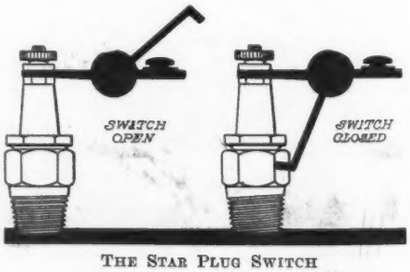
The Jones electric horn has been changed from last year. It now operates upon a new principle, employing an electric motor which causes a diaphragm to vibrate, the vibration of this diaphragm producing the sound. The motor is a complete electric one and is driven from a 6-volt battery or five or six dry cells. The axis of the motor is concentric with that of the horn and its rotation is transmitted to the diaphragm through a ratchet and spring arrangement.

The Atwater-Kent electric horn is a large diaphragm vibrated by an electro magnet. This horn does not use an electric motor.

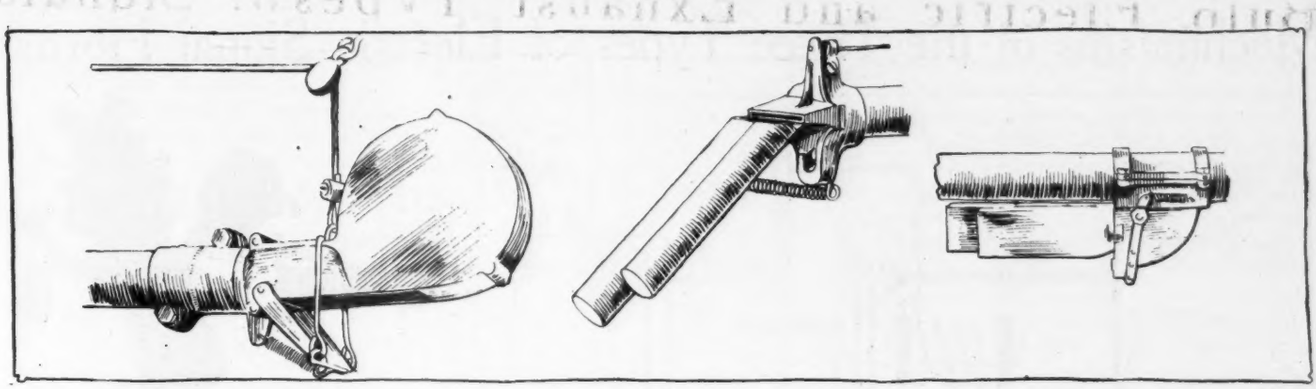
The Sparks-Withington horn is a combination electric and bulb. The sound-producing diaphragm is rolled electric steel. The electric mechanism is an electro magnet which causes a rapid vibration of the diaphragm. The wires for the electric system pass through the tubing used for the bulb and are so concealed.

The Dean Tuto electric horn gives two distinct notes by operating by one push button. The sound in this horn is produced

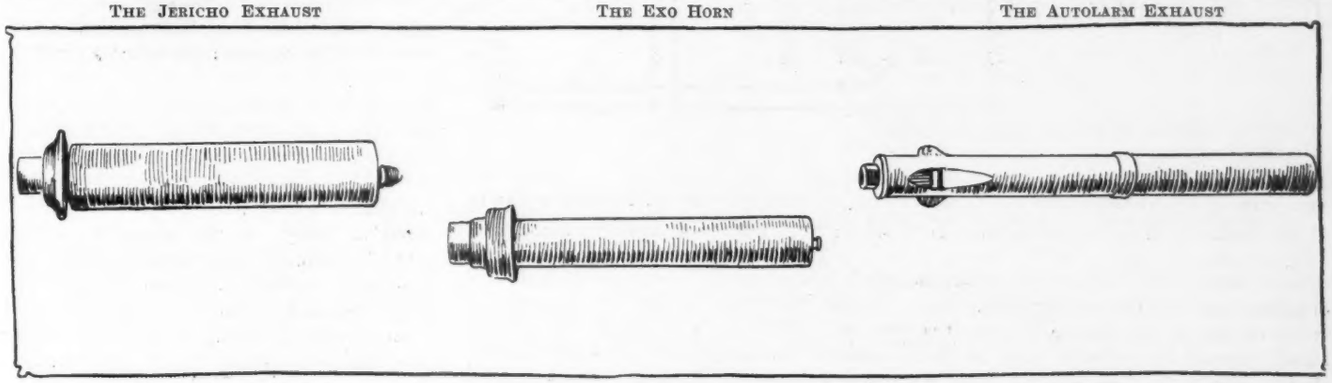
Star Plug Switch—The Star spark plug switch is a simple device for insertion between the top of a spark plug and the end of the ignition cable from the magneto. It is useful to discover which plug in a motor is missing in case of ignition troubles. It is an individual switch for each plug. With the switch open the current enters the central electrode of the plug, but with it closed the plug is short-circuited or cut out so that a spark does not take place in it. One of these switches is used on each plug. If missing occurs, the switches on Nos. 1, 2 and 3 cylinders are closed. Then No. 4 cylinder is sparking and will keep the motor running; if No. 4 is faulty the motor will stop. In a similar way plugs Nos. 1, 2 and 3 are tested, the plug under test being the only one in which the switch is left open.



THE STAR PLUG SWITCH



THE JERICHO EXHAUST THE EXO HORN THE AUTOLARM EXHAUST



THE BARCO HORN THE AUTOCHIME THE FOUR-TONE GABRIEL

by a vibrator which hits a light blow for a low tone and a hard blow for a loud or emergency signal.

Sireno a Distinct Type

The Sireno horn is in a class of its own in that it uses a rapidly revolving turbine to produce the sound. Some of these types are of the electric variety, and the Sireno is revolved by an electric motor. In some the turbine is driven by friction. One of the Sireno models is fitted with an electric brake so that the sound can be cut out as rapidly as possible.

Exhaust Horns

Exhaust horns are shown in the usual variety of style. The Gabriel is manufactured in the single-tube type to give four tones. The tube is 34 inches long and 3 inches in diameter. It is divided inside into four tubes of different size. The Gabriel is also manufactured in a three-note, single-tube horn, intended for cars of low power. One of the larger horns is the 10-tube Gabriel.

The Jericho exhaust horn is made of aluminum, and although but 11 inches by 5 inches in size, weighs but 2 pounds. When not in use the exhaust flows freely through the open throat of the horn. When the horn is used the door is pulled by pedal, thereby directing the exhaust through a shallow slot and across the sound chamber opening.

The Exo exhaust horn is a two-tube type in which the tubes are hinged to a bracket so that when not in use the exhaust has a free passage. By pressure on the horn pedal the exhaust is directed through a bracket and across the two brass tubes.

The line of bulb horns is a varied one and the styles equally varied. The Nonpareil horns are made with the regular bell end or with the coil ending.

The Cross horn has the appearance of an electric in that it is a straight trumpet tube with a cylindrical extension at the rear.

For limousine work the Cowles speaking tube has a megaphone extension for the driver, which is carried on a ball-and-socket joint from the seat pillar. This allows of the horn being pulled out to any position to the driver's ear without his having to take his eyes off the roadway ahead.

Le Testophone—The Le Testophone horn is a novel type and in a class by itself. It is a four-tube horn, the horns connecting at their inner ends with a central record tube in which is a record cylinder. The horn is delivered with one record which produces the four notes, sol, mi, do and sol. It is claimed to be possible with these four notes, by delicacy in pressing the bulb, to play national airs. A set of six different records can be purchased with the horn. A locking device is added by which the record can be locked when the car is left standing at the curb.

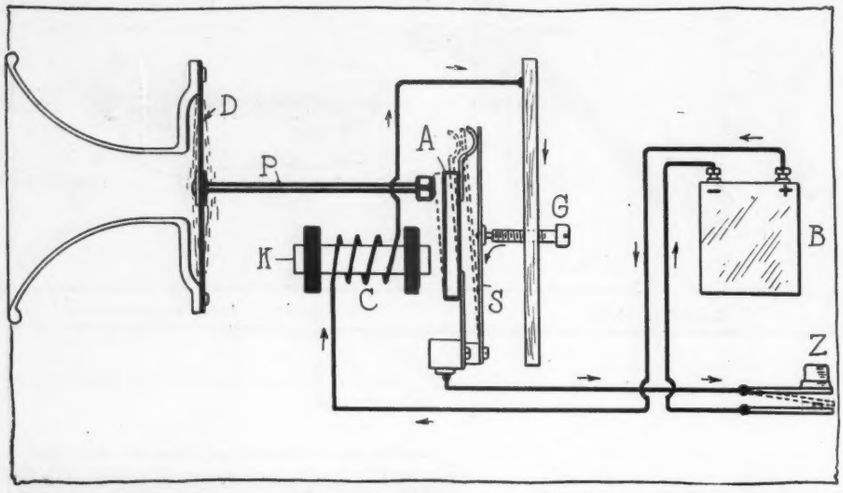
Autolarm—The Autolarm is an exhaust-operated horn which is fitted beneath the muffler pipe by simply cutting a notch in the under side of the exhaust pipe and clamping the horn bracket over the notch and around the pipe. The Autochime is a tubular exhaust horn, the tube measuring 2 inches in diameter and 15 inches long. The single tube is divided into a series of divisions, each producing its own note. The Autolarm is blown by pedal. Dirt from the exhaust, it is claimed, cannot clog the sound openings because the V-shaped valve remains in the sound openings except when the whistle is blown.

Barco—The Barco exhaust horn is a single tube design with horns made of alumi-

Illuminated License Tag—The Sure Number illuminated license tag is a combination of tail lamp and license number. The light may be either oil or electric. In either case it is carried in a separate compartment at one end and the light passes through a narrow slot in an opaque partition dividing the lamp compartment from that carrying the number. By means of a series of refected surfaces the rays of light from this one lamp are reflected along the complete light number plate. Where electricity is used a 6-candlepower lamp is required, the current being taken from a 6-volt battery, or set of dry cells. The consumption of this lamp is ⅔ ampere per hour. These number plates are made in two types, one in which either the oil or electric lamp can be used, and the other intended entirely for electric light. The latter is much narrower and weighs less. The combination type weighs 5 pounds. The size of the illuminated license plate is 6 by 19 inches.

SURE NUMBER ILLUMINATING LAMP

Mechanisms of the Three Types of Electric Signal Horns



PRINCIPLE OF ELECTRO-MAGNETIC HORN. THE PARTS ARE: B, BATTERY; Z, PRESS BUTTON; D, VIBRATING DIAPHRAGM; C, COIL; K, SOFT IRON CORE THAT BECOMES THE ELECTRO-MAGNET; A, VIBRATING ARMATURE; G, ADJUSTABLE CONTACT; P, PLUNGER THAT VIBRATES DIAPHRAGM

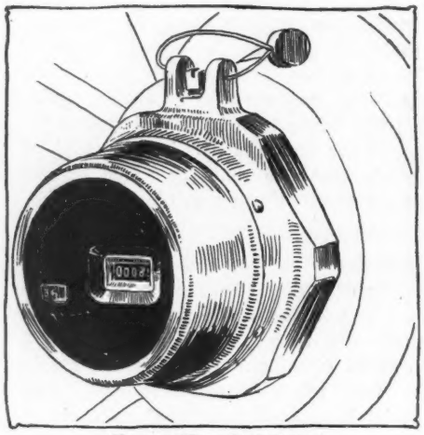
num or brass. The tube is 2¼ inches in diameter and 14½ inches long. The Barco valve cutout is a two-piece bracket that clamps around the exhaust tube, so that all that has to be done is cut a notch in the lower side of the muffler pipe.

Skinner—The Skinner exhaust signal is controlled by pedal and has a double control. By pressing the pedal half way down a loud barking noise is emitted, whereas pressing the pedal all of the way down the sound is drawn in or reduced.

Water Extractor—The Cresco water-absorbing tube is one of the novel things of the year. It is intended to absorb water from gasoline. All that is necessary to do is to drop the tube into the gasoline tank and leave it for some minutes. When it is withdrawn it will be completely filled with water. This can be driven out by heating for some time in an oven of moderate temperature. The tube has a capacity of absorbing 6 ounces of water. The absorbant is carried in a perforated metal case 2½ inches long and 1 inch in diameter. The nature of the absorbant material is not known but has been discovered by a New Haven chemist.

Veeder Hub Odometer—The Veeder hub odometer is a standard odometer incorporated in the hub cap and sealed thereon. It adds the mileage irrespective of whether the wheel rotates forward or backward. The method of driving is through a pair of spur gears, one attached to the stationary end of the spindle and the other carried in the revolving hub cap. The gear carried by the revolving hub cap revolves once for each revolution of the wheel and from this gear the odometer mechanism is driven by a ratchet and pawl device, all incorporated in the hub cap. The instrument reads through a window in the end of the hub cap. It is not necessary to open the instrument for any other purpose except removing the wheel.

To attach this odometer to any vehicle it is first necessary to drill a 5-16-inch hole in the center of the end of the axle, or spindle. The shank of the driving gear is inserted in this hole. A cotter pin is then inserted to retain it. The odometer is then screwed on and sealed.

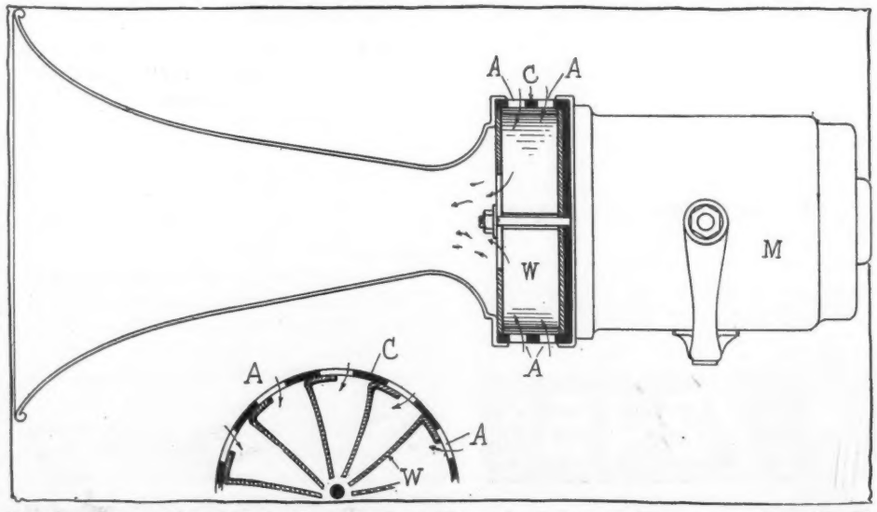


VEEDER HUB ODOMETER

THE PIERCING ELECTRIC

ROUGHLY speaking, there are two great classes of electric horns used at present for signal purposes on motor cars. In the first type the sound is produced by a vibrating diaphragm the same as in a telephone of today. In the second type the sound is produced by a rotating wheel with fan-shaped blades, this wheel being ordinarily termed a turbine.

In division 1, namely those horns which give forth their sound due to a vibrating diaphragm, there are two sub-divisions: First, that class in which the diaphragm is vibrated by an electric motor, and second, one in which the diaphragm is vibrated by electro-magnetic means. In either case a battery or dry cell current is needed. In one case the current is needed to drive the electric motor, and in the other case to operate the electro-magnetic arrangement. A typical example of operating the diaphragm by an electric motor is that used in the Klaxon horns. The motor, when rotating, drives a star wheel, which strikes upon a hardened steel rivet in the center of the vibrating diaphragm. As the motor rotates at great speed the diaphragm vibrations are ten times as great, due to their being ten teeth on the star wheel, and also that each tooth gives one vibration. The pitch of the tone depends upon the vibration, which is



PRINCIPLE OF THE SIREN HORN. THE ELECTRIC MOTOR IS CONTAINED WITHIN THE PART M; W IS THE ROTOR OR TURBINE DRIVEN BY THE MOTOR; C IS THE CASING IN WHICH THE ROTOR REVOLVES, AND A SHOWS THE AIR OPENINGS

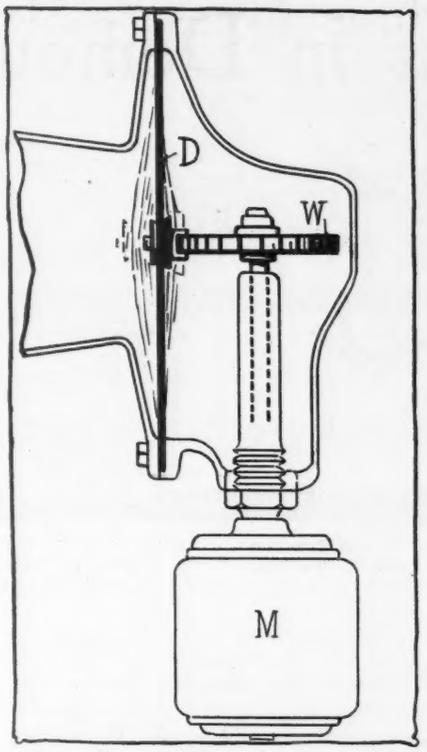
governed always by the speed of the motor. In operating a diaphragm by electro-magnetic means, as in the Dean horn, the battery current is conducted through a coil with a soft iron core. From this coil current flows through a contact screw and thence to a vibrating armature and back to the battery. When the circuit is closed the current flowing through the coil forms a temporary magnet of the soft iron core. This attracts the vibrating armature towards it, and immediately the circuit is broken. The vibrating armature has, however, hit a pin which is attached to the center of the diaphragm, causing a vibration of the diaphragm. In ordinary work the vibration of the armature is exceedingly fast, due to the rapid making and breaking of the circuit. It is the rapid vibration of the diaphragm that produces the sound.

In that division of electric horns in which the revolving turbine is used, of which the Sireno is an example, the electric motor is on the same shaft as the turbine. The faster the turbine rotates on its axis the higher the tone. The turbine motor is driven from an 8-volt storage battery. Dry cells will do but are not so satisfactory.

Jones Shaft Recorder—The Jones shaft recorder is driven from the front wheels of the car through a flexible shaft like a speedometer. The recording instrument contains a clock mechanism and a revolving chart rotated by the clock. The flexible shaft oscillates a recording needle on the oscillating end of which is a needle that makes a zigzag line on the chart whenever the car is in motion and when the car is idle the line is an arc of a circle. The chart rotates whether the car is idle or running. One chart will last for a week and revolves one revolution per day.

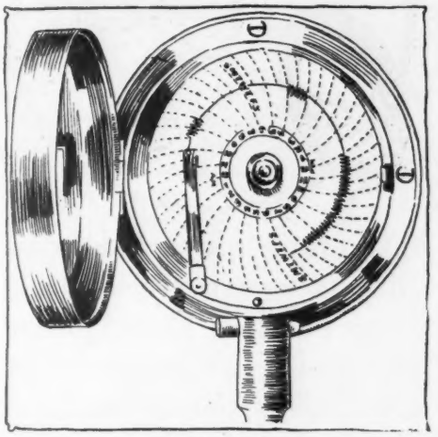
The face of the chart is divided into seven concentric rings, each ring being a record space for a day. The clock revolving the disk is set to run 8 days and the pendulum is so regulated that it moves in the outer ring space on 1 day and shifts to the successive inner rings on the following day. This device gives an exact record of the car performance and also the speed in miles per hour. Each cross line of the zigzag represents 2 miles of travel and as the circle is divided off into quarter-hour spaces the speed at which the vehicle is operated at any time can be discovered.

Casgrain Speedometer—The Casgrain speedometer is a liquid type in which the fluid is a mineral oil. The end of the flexible shaft in the instrument connects with and rotates with a hollow cylinder with short radial spokes resembling, as it were, an internal paddle wheel. Inside this and entirely free from it, is a smaller external paddle wheel which connects with the indicating device. As the paddle wheel driven by the flexible shaft rotates it causes the mineral oil to circulate with it, and this movement of the mineral oil tends to pull the other paddle wheel along with it, so that with the greater car



THE KLAXON PRINCIPLE. THE ELECTRIC MOTOR M, GEARED DIRECT TO THE STAR WHEEL W, ROTATES THIS WHEEL VERY RAPIDLY; THE NOTCHES ON THIS WHEEL HIT UPON THE STEEL RIVET IN THE DIAPHRAGM D AND CAUSE RAPID VIBRATION

speed the greater is the pull exerted through the mineral oil and the more is the internal paddle wheel drawn against its spring. A compensating spring returns the indicating paddle wheel to zero



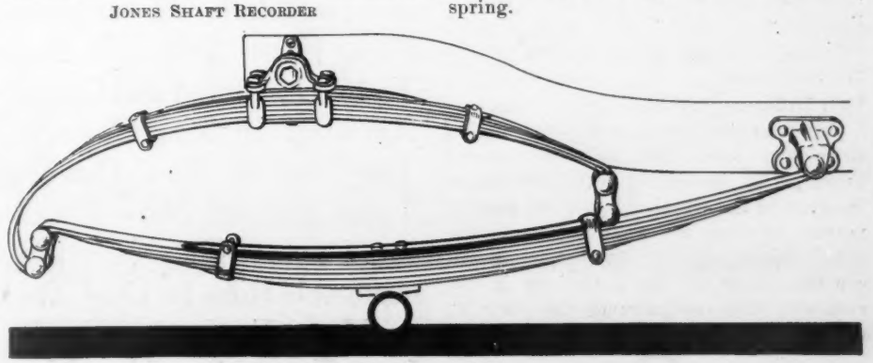
JONES SHAFT RECORDER

when the car stops. This is the same principle of operation as used a year ago, but an improvement has been made in that whereas last year the instruments were all of the horizontal cylinder design a new type has the cylinder mounted vertically.

Jones Pendulum Recorder—The Jones pendulum recorder is a telltale device for recording the time when vehicles are moving. It is not driven by a flexible shaft; in fact there is no drive to it, and it consists merely of a clock mechanism revolving a circular chart. A pendulum is arranged so that whenever the car moves the pendulum swings to and fro and the point on the upper end marks a zigzag line on a chart. It is the vibration of the vehicle which causes the pendulum to oscillate. The circular chart is set to last for a week and the clock will run for a week. The recorder can be fastened to the dash or any other part of the car and sealed in position.

Jones Gasoline Meter—The Jones gasoline meter for recording the amount of gasoline in a tank is a cylindrical case carried on the dash with a dial reading from one to eighteen, each space representing an inch in depth in the gasoline tank. From this gauge a hollow pipe leads to the top of the gasoline tank and thence to the bottom of the tank. This pipe is normally filled with air and when the tank is filled with gasoline the gasoline rises in the pipe and compresses the air in it. This compression is transmitted to a diaphragm and thence to the indicating needle on the instrument. The reading on the dial is in direct proportion to the quantity of gasoline in the tank. Although designed for a tank 18 inches in depth the gauge can be used on tanks of different depths, accepting that it will only record inch per inch in the tank depth.

The Radial-Elliptic Spring—A spring novelty intended to supplant the three-quarter elliptic style is one known as the radial-elliptic of the Garden City Spring Co. The spring is an elliptic with the shorter upper half secured at its forward end to a short upper leaf on the lower half. It is called radial in that the front part of the lower spring is a true radius rod extending from the side member of the frame to the rear axle. A freedom of movement is obtained by carrying the frame on a pivot support on the top of the spring.



THE LATEST SPRING TYPE, THE RADIAL-ELLIPTIC

Improvements in Demountable Rims

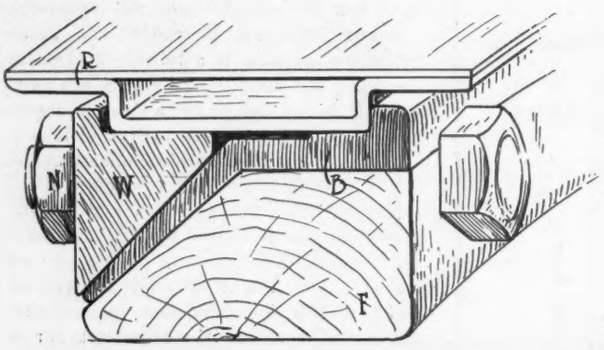


FIG. 1—FISK DEMOUNTABLE RIM, IN WHICH A BOLT PASSES THROUGH THE FELLOE F, THE BAND B AND THE WEDGE RING W, CLAMPING THE RIM R IN PLACE

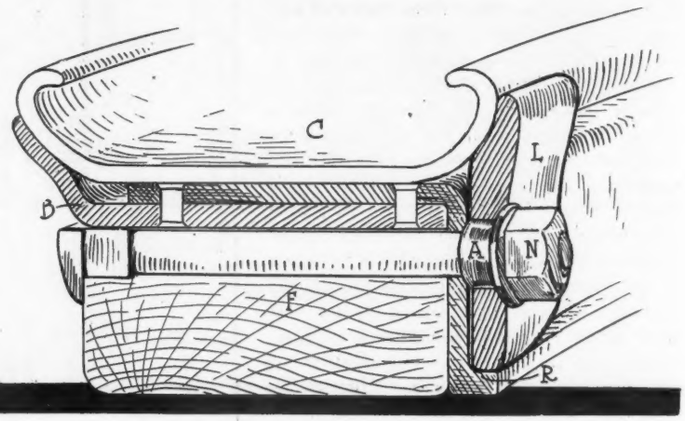


FIG. 2—THE EMPIRE DEMOUNTABLE RIM: F, FELLOE; B, FELLOE BAND; R, RING; C, RIM; L, CLAMP; A, COLLAR; N, NUT. THE CLAMP L SWINGS OUT OF WAY WHEN IT IS LOOSENED

SIMPLICITY seems to be the keynote in the demountable rim field this year. The inconveniences and delays due to lost nuts, bolts and wedges have forced the users to demand fewer loose parts, while the advantages of rapid rim changes have led the manufacturers to produce rims in which fewer nuts or bolts need be loosened and still fewer which need be taken entirely off.

While this change toward speed and simplicity has been taking place, the need for absolute staying power has not been lost sight of, for the rims may be depended upon more than ever to remain on the wheels under trying conditions.

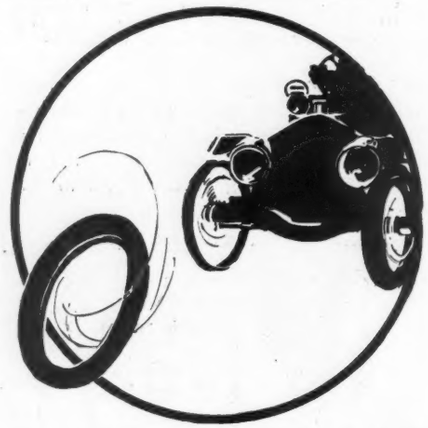
Simplicity Aimed

Different methods to obtain these results have been used by the various manufacturers. The change to the present quick-change feature from the early rims, in which is was necessary to remove eight or ten bolts, with their accompanying nuts, washers, clamps and wedges, in order to take off a tire and later to hunt more or less successfully for them in the dust or mud, shows progress in the right direction.

A strong indication of advance in this line is the adaptation of the demountable feature to wheels for commercial cars. One manufacturer in particular is just bringing out a demountable rim for dual wheels such as are used on motor trucks. Especially is there a need of such dual equipment, capable of quick changing, for fire apparatus.

Four Different Classes

Demountable rims naturally divide themselves into four different classes based on the method by which the rim is fastened to the wheel. By far the greater portion of them are what may be called the bolted type. A second type is the split-rim class, in which the rim is cut crosswise from one side to the other at one point. A third class is the expanding ring type, in which a ring between the felloe and rim is lengthened slightly to tighten the rim. Still another class may be called the wedge type. Here the rim is mechanically slid on the felloe band to bring wedges on the rim over similar wedges on the band. The bolted type will be considered first. In rims of this class a series of four, five, six or eight bolts pass transversely through the felloe of the wheel and engage either separate clamps or radial lugs on the demountable rim, or else a wedge ring which bears upon the rim and holds the latter in place.



Car Users Have Educated Manufacturers of Demountable Rims To Make Them Quicker and Easier To Change. The Offerings in Rims of this Kind Are Notable for Fewer Loose Parts, Fewer Nuts and Bolts To be Unscrewed and Greater Rapidity in Rim Changes. They Are of Four Different Types and All Show Excellent Staying Qualities. Demountable Rims for Dual Tires on Motor Trucks Are Coming Into Extensive Use Now

Fisk Demountable Rim

The new Fisk rim, Fig. 1, made for the Fisk mechanically-attached tire, has the felloe beveled off through half of its width at an angle of about 45 degrees. Upon the felloe fits a band, which conforms in shape to it and which bears a shoulder upon the side opposite to the bevel. This band is held in place by bolts which pass through the felloe, the band, and lastly a continuous wedge ring which has a similar shoulder. The wedge ring is thus forced up the beveled side and the shoulders grasp a U-shaped channel ring to which the tire is fastened. The web band seen in the older models has been done away with, allowing the use of longer spokes in the wheel and making it lighter.

The Fisk demountable rim also has appeared as a demountable for use with dual pneumatic tires on commercial vehicles up to 10,000 pounds capacity. These also are used on motor-driven fire apparatus, where quick tire changes are imperative. The rim is an adaptation of the regular Fisk demountable and a replacement can be made in a few minutes. The removal of ten nuts permits displacement of two rings allowing both rims to be taken off.

Empire Demountable

Where separate clamps are used for holding the rim in place, these are sometimes arranged so that they may be turned sideways when the nut is loosened, so that the nut and clamp need not be taken entirely off the bolt to remove the rim, and so become lost. Such an arrangement is used in the Empire demountable shown in Fig. 2. In this rim the wooden felloe

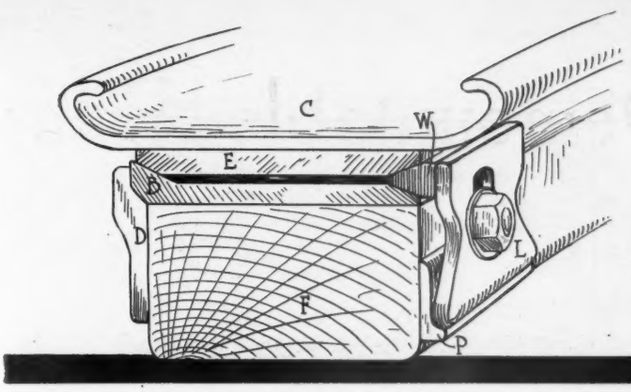


FIG. 3—FIRESTONE RIM HAS SLOTTED CLAMP L, WHICH IS LIFTED OFF PLATE P TO LOOSEN WEDGE RING W BETWEEN BAND B ON FELLOE F AND RING E, RELEASING RIM AND FORM THE WHEEL

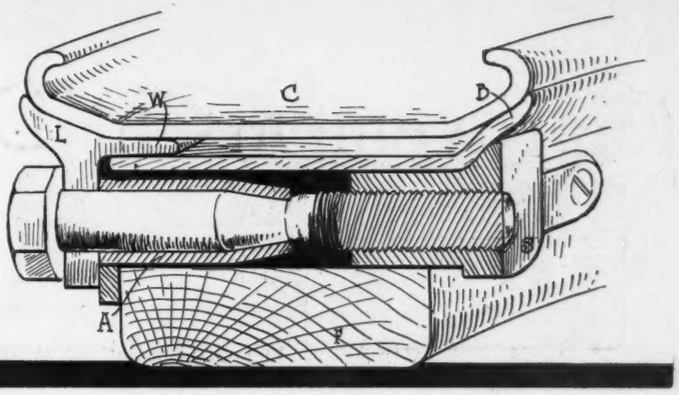


FIG. 4—THE UNIVERSAL BAKER BOLTED DEMOUNTABLE: C, RIM; B, FELLOE BAND; L, CLAMP; W, WEDGE; A, SLEEVE; S, STUD PLATE THE SLEEVE A DRAWS THE CLAMP WHEN THE BOLT IS UNSCREWED

carries a steel band, which is flanged on the inner side of the wheel. The outside of the band is smooth, so that the continuous rim can be slipped over it into place. To this band are riveted eight L-shaped stirrups, extending down over the felloe. The bottom of each stirrup has a shoulder in which rests the end of a clamp, which is held in place by a bolt passing through it and the felloe. When the nut is tight, the rim is held between the flange of the band and the upper end of the clamp. The nut has a collar over which the clamp rests, so that a few turns loosen the nut sufficiently to allow the clamp to be turned sideways, permitting the rim to be slid off.

Michelin Demountable

The Michelin demountable, Fig. 5, remains in its old form, just as it has been marketed for the last 4 years. Upon the felloe of the wheel is a steel band which is bent at right angles over one side of the felloe and on the other side is bent upward to hold the rim. Clamps having the usual wedge-shaped projection which is inserted between felloe band and rim, hold the rim firmly in place. In all of these it is necessary to remove the nuts entirely from the bolts to change rims.

Continental Demountable

The Continental Caoutchouc Co., which brought out its new Gilbert type quick-detachable demountable early in the fall, has made little change in the demountable feature of the rim. As shown in Fig. 6, a flanged band is shrunk on the felloe, and upon this the rim bears. This rim is held in place by a series of eight clamps with wedge-shaped projections, which enter between the felloe band and the rim. The rim is prevented from slipping back and forth on the felloe by projections, on its under side, which rest in recesses in the felloe. Bolts passing through the clamps and the felloe hold the tire in place.

Firestone Demountable

In the new Firestone demountable, also, separate clamps are used, as shown in Fig. 3. These are arranged so that the nut need not be taken entirely off. This is accomplished by using a clamp which presses against a wedge ring. The clamp has a slot through which the bolt passes, and the lower end rests on a shoulder of a plate or stirrup fastened to the felloe. When the nut is loosened, the lower end of the clamp can be lifted from the shoulder and will then drop down out of the way, allowing for the removal of first the wedging ring and then the rim. Other rims of the type have the bolts so arranged that when the nut has been loosened a certain number of turns, the wedge lug is automatically turned out of the way of the rim to allow of its removal, and is again automatically turned up into clamping position when the nut is tightened.

Baker Bolted Demountable

The Baker demountable, which heretofore has been solely of the split-ring type, has appeared as a bolted rim as well and is illustrated in Fig. 4. Although the split-rim feature is embodied in the new type, this is merely for quick tire detachment, the method of attachment to the wheel being entirely by bolts. This also embodies the use of a wedge clamp, which turns automatically out of the way when the nut is loosened a few turns. This is accomplished by the use of a bolt upon which a collar is pressed, which holds the wedge against the bolt head, but loosely enough that the brace socket wrench turns it around when the bolt is loosened. This allows the rim to be slipped off the felloe. As mentioned, the rim itself is split and is held in place by a stud-plate carrying four dowel pins, which pass through holes in the rim and into depressions in the felloe.

New Dorian Demountable

In the latest Dorian rim, illustrated in Fig. 7, the wedge clamp and nut are kept attached to the felloe in a novel way. As will be seen from Fig. 7, the nut passes partially through the clamp and has a collar over which fits a cap. The cap is riveted to the clamp and allows the nut to be turned by the socket wrench, but keeps it from coming away from the clamp. A

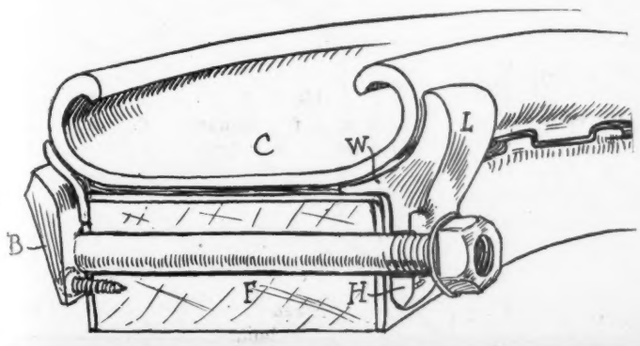


FIG. 5—MICHELIN DEMOUNTABLE: W, WEDGE ON CLAMP L; C, RIM; F, FELLOE; B, BOLT HEAD

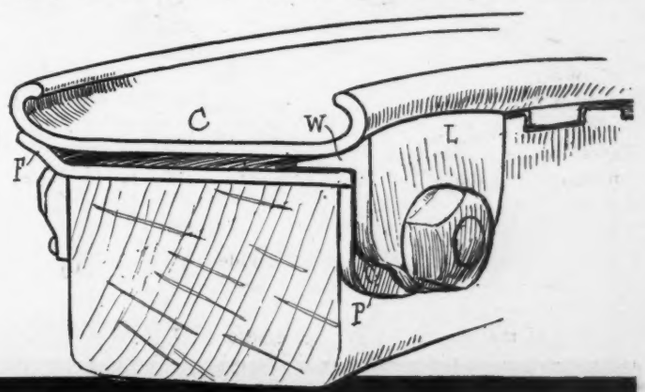


FIG. 6—THE CONTINENTAL DEMOUNTABLE: C, RIM; F, FELLOE BAND; L, CLAMP; W, WEDGE PROJECTION ON CLAMP; P, PLATE

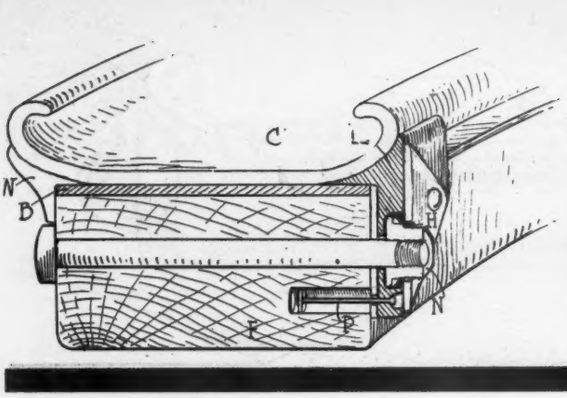


FIG. 7—IN ONE DORIAN DEMOUNTABLE NUT N AND WEDGE CLAMP L ARE HELD BY PIN P AND CAP H. B, FELLOE BAND; C, RIM

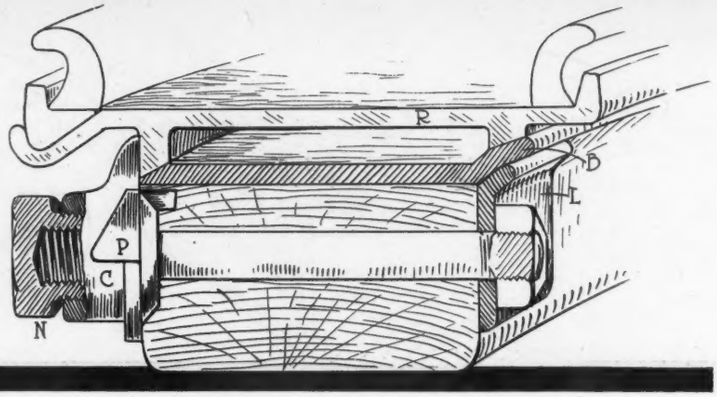


FIG. 8—STANDARD DEMOUNTABLE. L, CLAMP; B, FELLOE BAND; R, RIM; C, COLLAR ON NUT N; P, PROJECTION ON COLLAR

pin about 1½ inches in length is fastened to the lower part of the cap and passes through a plate screwed to the felloe. It is upset on each end and the clamp and nut are thus kept from falling to the ground. When the nut is unscrewed from the bolt, both nut and clamp fall from it by their own weight, turning out of the way of the rim.

Another division of this general type of bolted rims is that in which two adjacent wedge-shaped clamps are connected by a rib. One of this kind is the original Dorian demountable, shown in Fig. 13. This has four ribs carrying a clamp and nut on each end. The nut has a collar which passes through the clamp and is upset on the inner side of the clamp so that although the nuts can be turned they are permanently attached to the clamps, while the bolts remain in the felloe. In changing rims four nuts are loosened, allowing the removal of two ribs, when the rim may be removed or replaced. There are then only two loose pieces, the two ribs with the nuts and lugs attached.

Split Rim Type

In the split-rim type of demountables the tire rim itself is split at one point and is removed from the wheel by allowing the rim to spring apart. It is usually necessary that the tire be deflated when the rim is to be taken off, as the air pressure helps materially in keeping the rim in place. It is necessary, however, to provide other means for holding the rim on the wheel and this is usually accomplished by means of a lock with a lever action, which pulls the parts of the rim together and holds them thus.

Baker Universal Rim

The Universal Rim Co. in its early type of Baker demountable uses a lock of this kind and is illustrated in Fig 14. The lock is operated by means of a lever tool having two pins which fit into a hole in the locking bar and one in the other portion of the rim. A very powerful pressure can be brought to bear, as the tool handle provides a long lever arm. The locking bar catches over a pin on the other half of the rim and when the tire is inflated the tendency to spread the rim is sufficient to prevent the lock from opening.

Standard Welding Demountable

The rim made by the Standard Welding Co. is of the bolted type, in which separate clamps automatically turn out of the way of the rim when the nut has been loosened. The rim, Fig. 8, consists of a continuous wedge ring on the inner side which presses upon a flat band upon the felloe, which has a wedge-shaped extension to fit the wedge ring. This band is beveled at its outer edge and upon it rests the bottom of a U-shaped channel rim. The edge of the clamp extends above the felloe and when tightened wedges the rim tightly against the inner edge of the band. The nut is fitted with a collar having an inside thread to correspond with the bolt. The clamp is fitted over the collar and when the nut is loosened is turned out of engagement with the rim, allowing it to be slid off the wheel. This demountable is used for any straight-side or clincher tire.

Expanding Rings

A third type is that of the expanding ring and depends for its action upon the spreading of segments of a ring placed between the rim and the felloe. The rim itself is not split, but when a replacement is necessary the ring is brought together, thus giving it a smaller circumference and allowing the rim to be slipped off. A rim of this type is the Howard, which may be used for any type of clincher or straight-sided rims. In this rim the ring is brought together or expanded by means of a worm and gear, it being only necessary to turn one bolt to allow of loosening the rim. The expanding ring was originally made of aluminum, but is recently being made of

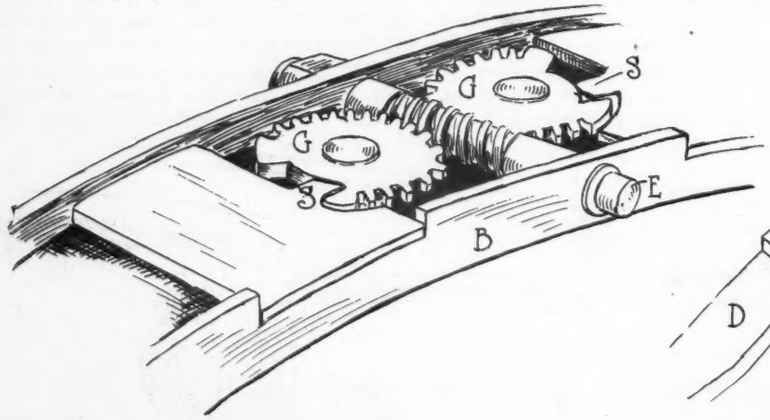


FIG. 9—THE BOOTH DEMOUNTABLE HAS A WORM AND GEAR LOCK. E, WORM; G, GEAR; S, SHOULDER ON PLATE. BY TURNING THE WORM GEARS G ARE ROTATED AND PLATES MOVED OUT

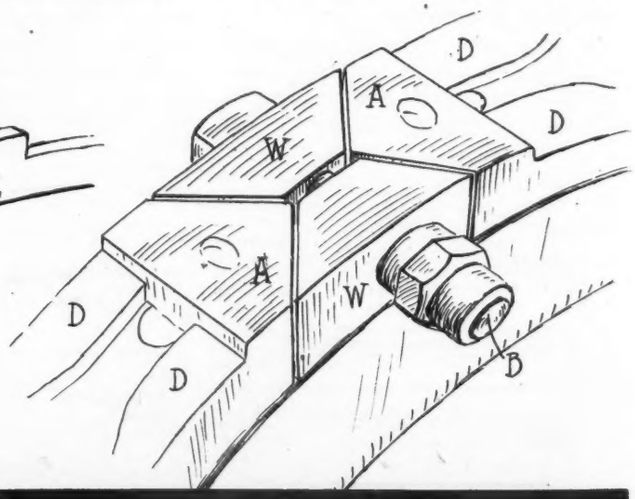


FIG. 10—THE DENEGRE DEMOUNTABLE. W AND W ARE WEDGES BROUGHT TOGETHER BY BOLT B; A AND A ARE BLOCKS ON BAND; D, D ARE TAPERED WEDGES

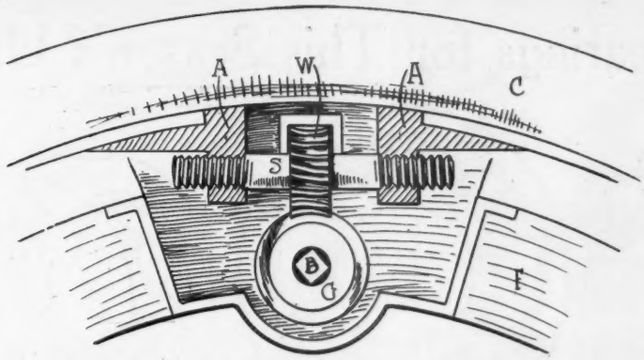


FIG. 11—HOWARD EXPANDING RING DEMOUNTABLE RIM. G, WORM MESHING WITH WORM GEAR W AND MOVING ENDS A A OF RIM C

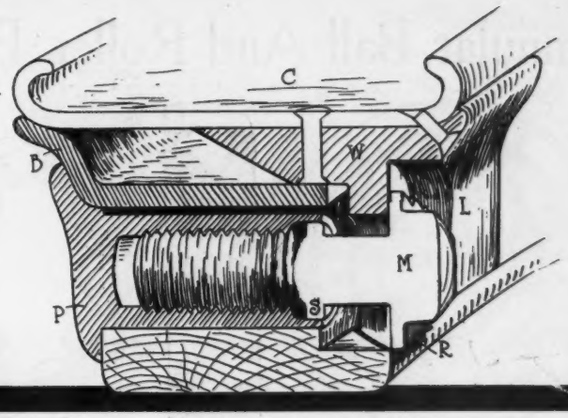


FIG. 12—THE LAMBERT DEMOUNTABLE. C, RIM; W, WEDGE; B, FELLOE BAND; L, CLAMP; S, SHOULDER ON BOLT M; P, STUD

carbonized iron. A lug on the inside of one portion of the ring is brought up to and catches in a slot in the other portion, thus locking it in place. When it is desired to loosen it the turning of the worm gear automatically releases this catch.

Booth Demountable

Another rim of the expanding-ring type is the Booth demountable. In wheels up to 40 inches in diameter three sets of locks are used and in those of 40 inches or more four sets are used. Fig. 9 shows the construction of the locking gears. Two toothed wheels mesh with the worm gear, which is turned by socket wrench. The teeth on each wheel are cut away about one-quarter of the circumference, forming two shoulders on each, which engage with lugs on the demountable rim, so that when the rim is pushed in place on the felloe, turning the worm rotates the wheels so that they engage in these lugs and bind the rim in place. The sketch shows the wheels engaging the lugs so that the demountable rim is held in position on the felloe.

Denegre Demountable

A fourth and last type of demountable rim is that in which wedge-shaped pieces are permanently fastened on the rim and other wedge-shaped pieces are permanently fastened to the felloe band, the only other necessity being some method of drawing the rim or the band around so that wedges act upon each other and thus tighten the rim to hold it in place. This method is used in the Denegre demountable. On the inside surface of the rim are placed thirteen fasteners, spaced at equal distances. These fasteners are about 2 inches wide by 2½ inches long and are provided with tongues or ribs ⅝-inch wide. The fasteners or wedges taper from the center toward either end and are thus capable of being placed right or left. A band is shrunk around the felloe and is made of ¼ by 2-inch steel. On this band are wedges to correspond with those on the rim. These are provided with grooves which grip the tongues in the wedges on the rim. Between two blocks on the felloe band are two movable wedges which are drawn together by means of a bolt fitted with a castle nut and cotter pin. When the wedges come together they force the tapered wedges on the rim to slide up over those on the band, holding the tire rigidly in place, as shown in Fig. 10.

Lambert Demountable

Another of the wedge type is the Lambert demountable. In this, as in the Denegre, there is only one bolt and it is the only removable part. Permanently riveted to the wheel are a number of wedges and on the side of rim at points exactly opposite are riveted wedge-shaped plates. At a point in the rim opposite the valve hole is a slotted tongue which fits into the felloe. A chrome nickel steel bolt shown in Fig. 12. On the bolt is a ratchet-wheel with curved teeth into which a pawl is held by means of a spring. This arrangement prevents the bolt from turning when on the wheel.

passes through the slot in the tongue and through the felloe. A feature of this rim is the method of locking the bolt. It is

The Question of Safety

While it is a fact that a very large percentage of the makers of demountable rims are advocates of the bolted type of rim it will be seen that the other three classes have their adherents. It is true that, as a rule, the bolted type necessitates more time being taken for a tire change, but many users believe that the rims of this type are less liable to become loosened with use. They think that the extra time devoted to tire changes is a good investment in the way of safety. Nevertheless, practically all of the rims of the other types have wonderful records for stability not only in gruelling track work and road races, but in smash-ups which have almost totally demolished the rest of the wheel.

It is not intended to take up here a discussion of the tire equipment or quick-detachable features of demountable rims. It may be explained, however, that with the exception of the Fisk demountable, which is designed for the mechanically attached tire, almost any tire may be fitted to all of these rims. The rims shown in most of the illustrations are for clincher tires, but a change in the wedge ring in some demountables or in the clamps in others will allow of the use of other tires.

New Flexible Shaft

A new flexible shaft is being used on all instruments used on commercial vehicles and an option of fitting it on pleasure cars is given. It is made of alternate hook links and cylindrical shaped stamped links, the stamped link being of sufficient diameter to revolve smoothly inside of the shaft housing but not to leave any room for side sway or slapping. The old flexible shaft is continued and consists of a solid steel core around which are wound in oposite directions four layers of cable made up of three strands each.

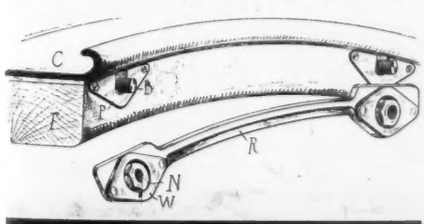


FIG. 13—DORIAN RIM. NUTS AND CLAMPS CONNECTED BY RIB R; NUTS H HELD ON RIB BY WASHER W: P, PLATE; B, BOLT; C, RIM

A PART OF THE NEW FLEXIBLE SHAFT USED ON ALL JONES INSTRUMENTS FOR COMMERCIAL VEHICLES

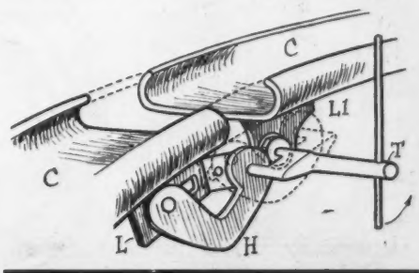
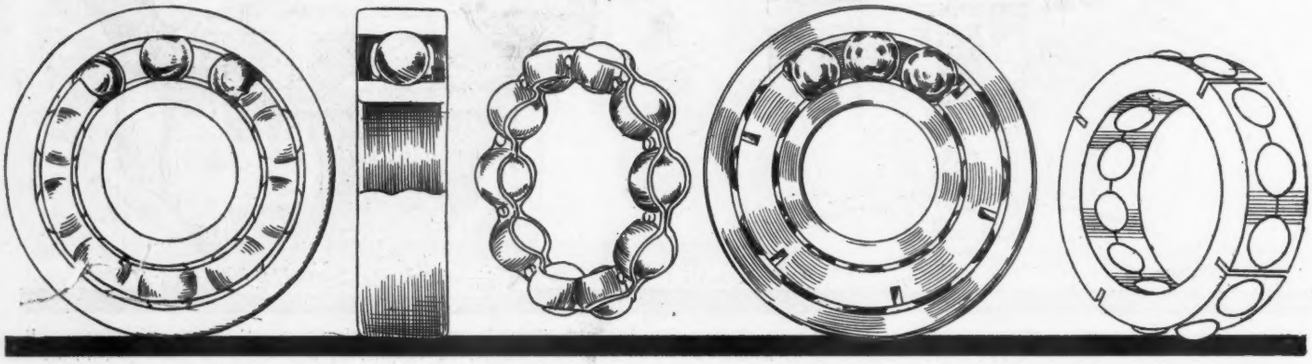


FIG. 14—BAKER UNIVERSAL SPLIT RIM DEMOUNTABLE. C, RIM; H, LOCKING LEVER; T, TOOL; L, LEVER LUG; L1, LATCH LUG

Annular Ball And Roller Bearings for This Season's Use



TWO F. AND S. ANNULAR TYPES. THE FIRST THREE ILLUSTRATIONS SHOW THE STAMPED SEPARATOR; THE OTHERS THE DIE-CAST ONE

HESS-BRIGHT Bearings—In the Hess-Bright annular ball bearing the use of a pressed brass ball retainer is continued. This retainer is a ring with a series of two projections at each side to receive each ball. With the ball once in place these arms are pressed over, corresponding with the curvature of the ball, and thereby forming a complete cage for it. The Hess-Bright is assembled by placing the inner and outer race eccentric in order to insert the balls. The use of a slot on the side of the inner race in order to insert the ball is not followed.

This company has a complete line of magneto bearings which are of the cup-and-cone type with the balls carried in a retainer. The cup-and-cone design is used in order to care for the thrust. The Hess-Bright line of thrust bearings is continued. One of the thrust rings has a spherical seat intended to bear against a corresponding spherical shoulder when the bearing is in place. The company also makes a thrust bearing with both seats flat.

F. & S. Bearings—A new product in the line of F. & S. annular ball bearings is the double-race type, which is designed to be used where the load is high and the dimensions into which the bearing must be placed limited. These bearings are made in the same diameters as single-race types. A characteristic feature of the bearing is that there is a separate retainer for each race of balls. The use of a separate retainer gives every freedom of movement to each of the two races, the same as in a single-ball type.

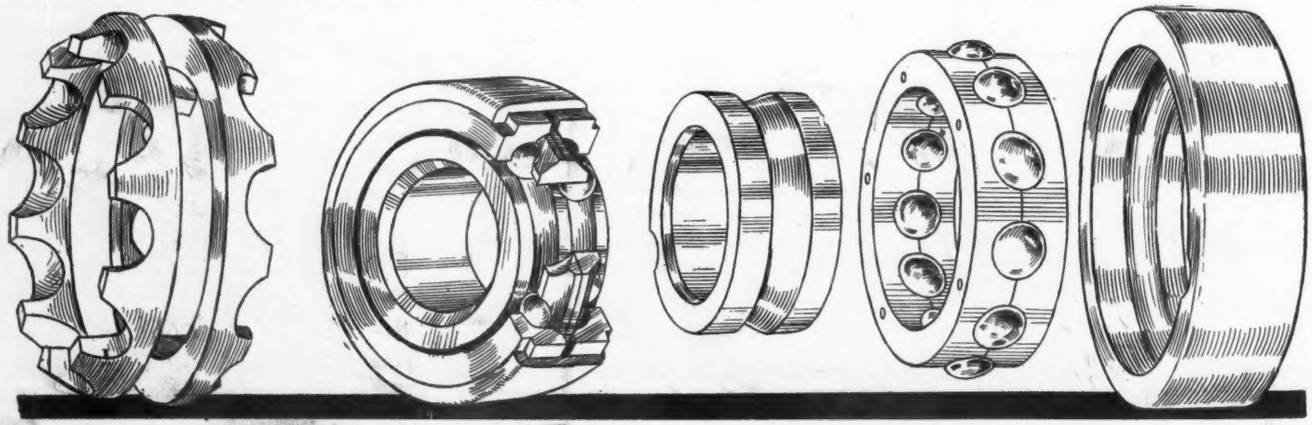
BALL BEARINGS

Annular Ball Bearings Show Much Improvement in Many Cases. The Double-Race of Balls with Separate Ball-Retainer Is Gaining in Popularity, Nearly all of the Big Makers Using It. It Allows of Using Annular Bearings Where the Space Is too Limited for a Single-Race Type. With Double-Race Bearings the Length Is Greater but the Diameter Can Be Materially Reduced. Effort Is Strong to Get as Many Balls Into the Bearing as Is Possible

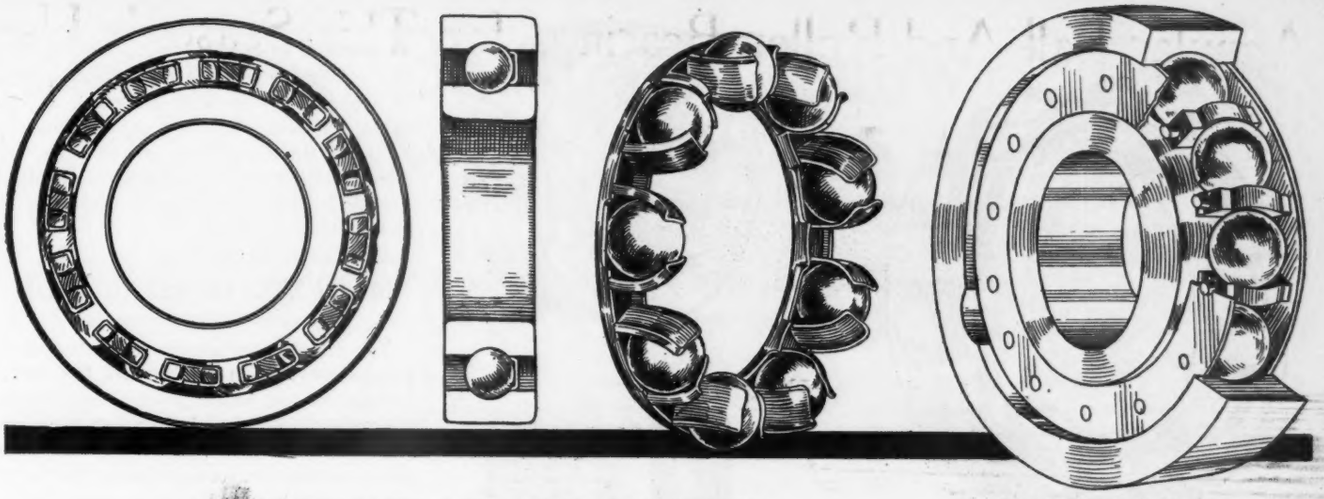
F. & S. bearings are manufactured with two types of ball retainers. The solid cage retainer allows of carrying a greater number of balls in the same diameter bearing. This ball-retainer is made in halves with a separate cage for each ball formed in the halves brought together. The halves are held together by a series of metal clips in countersunk holes. The other F. & S. retainer is known as the W H, and is two-part stamping, forming a pocket for each ball and the halves of the retainer riveted together between adjacent balls.

New Departure Ball Bearings—The New Departure ball bearings is now made with the single race of balls as well as the double race. The separator is of special alloy phosphor bronze, made in halves, which face each other and contain the single row of balls, each ball carried in a cage. The halves of the separator are riveted together. This single-row bearing is so constructed as to leave very little opening between the inner and outer race through which grit or dirt can enter.

The New Departure double race bearing is continued for this year. It has been improved in that the separator is now made in halves instead of in one piece. Making it in halves allows of the balls in each



NEW-DEPARTURE BEARINGS IN SINGLE AND DOUBLE RACES. THE TWO-PART SEPARATOR USED IN THE DOUBLE-RACE TYPE, ALSO THE NEW SINGLE-RACE TYPE



THE HESS-BRIGHT ANNULAR WITH STAMPED BRASS SEPARATOR

THE SCHAFER ANNULAR

race rolling circumferentially with the separator as desired and does not compel both races of balls to roll together. The sockets for the balls are of greater radius than the balls to allow for efficient lubrication. The separator is not a point-contact one, but is designed so that lubrication is retained at the diametrical center of the ball at right angles to the point of rotation in the pocket, this being the point at which the ball can be retained at its proper position with a minimum pressure against the separator.

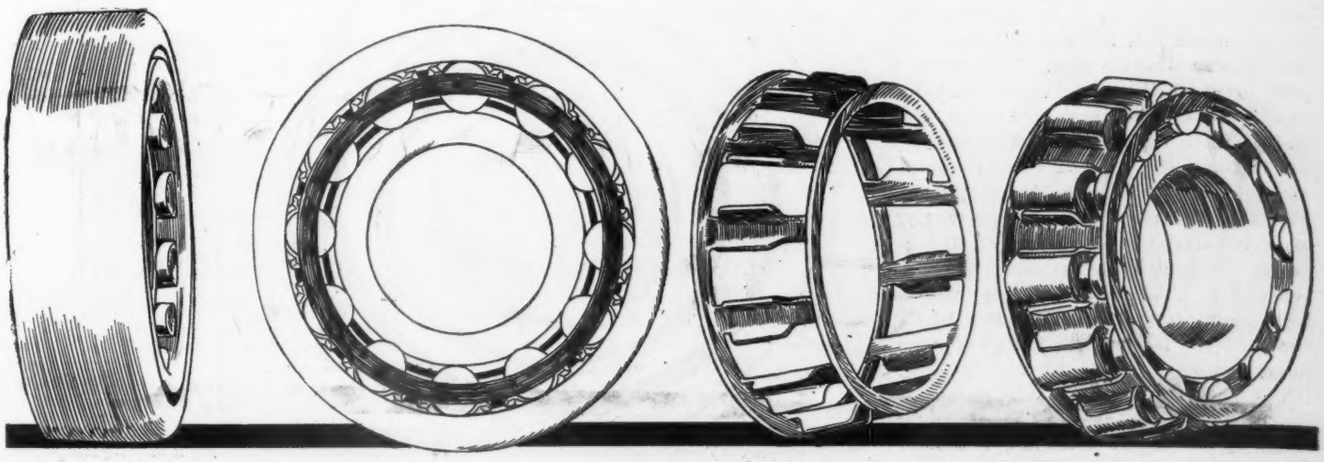
Timken Roller Bearings—Timken roller bearings are made in three types, the same as last year, namely, the long series, short series and annular displacement. The annular displacement type is made in the same standard sizes as the annular ball types, so that they can be used where a corresponding size of the ball type can. These bearings use a conical roller riding between a conical inner race and a conical outer race. Because of this construction the bearing will carry a radial as well as a thrust load. The rollers are made of nickel steel and open-hearth steel for the cones and cups, which are other names for the inner and outer races. The rollers, cups and cones are ground, the rollers are gauged for variation less than .0005-inch at the mid-point diameter. The rollers are given three heat treatments and the cups and cones two. A separator which carries the rollers is a steel stamping and retains the roller of the unit on the cone only. The long-series bearings are used for commercial vehicles and on many pleasure cars, and the short series on pleasure cars where the bearing space is limited.

Schafer Ball Bearings—The most important 1911 feature of the Schafer ball bearing is the introduction of a new type specially intended for use in front road wheels, in differential cases, for flywheel clutches and steering gears. This bearing is an annular type designed to take a thrust as well as carry a radial load. It employs a full race of balls, with no separator between adjacent balls. This bearing is made in the same sizes as the regular annular type, but differs in that the outer race has a circumferential flange at one side and the inner race has a circumferential flange at the other side. With this design any thrust simply presses the outer race against the inner through the medium of the balls or vice versa.

There also is a new annual Schafer bearing with a double row of balls and a single outer race and a single inner race. In this bearing there is but one divider for the two races of balls. This bearing is intended for bearings where there is not enough radial space for a large diameter bearings and in order to get the requisite bearing factor the length is increased by using the two races of balls.

A dust-proof annual bearing type is included for this year. The dust-proofing agent is a metallic disk which completely fills the annular space between the inner and outer ball races. A handy feature that is ready for this year in connection with Schafer bearings is a split cone sleeve designed to fit around a shaft which is too small diameter for regular annular bearings. This split sleeve can be pressed in between the bearing and shaft until the required close fit is obtained. In the Schafer annular bearing from 92 to 95 per cent of the annular space between the races is filled with balls.

B-K-F Ball Bearing—The B-K-F annular ball bearing uses chrome crucible steel inner and outer races or rings. These rings are grooved on their opposing faces, forming a path for the balls to travel in, the curvature of the groove corresponding with the curvature of the ball instead of the ball contacting at a single point with each groove. The separator is a one-piece antifriction ring with concave pockets for the balls. The balls are held in the separator by a retaining ring which fits in a groove



THE TIMKEN ROLLER BEARING, SHOWING ROLLER RETAINER, WITH AND WITHOUT ROLLERS

THE B-K-F SEPARATOR

GLOBE ANTI-FRICTION BEARING

in the end of the separating teeth of the separator, the ends of the teeth being forced over the ring to hold it in place. By using grooved pockets and grooves in the races corresponding with the ball curvature, it is claimed that this bearing is suitable for taking care of a thrust as well as of a radial load, which is very useful in places.

Globe Anti-Friction Bearings—The Globe anti-friction roller bearing is made with either the cylindrical or tapered roller. The cylindrical roller is used where only a radial load has to be carried, whereas the tapered roller is employed where there is a radial and thrust load, such as in the front wheels of a motor car. The rollers in each style are separated by a separator made of anti-friction material and carrying a ball in each end, so that adjacent rollers are separated by two balls. The separators and rollers are not carried in a rigid cage, or in any cage at all, but the spaces and rollers fill completely the outer ring or rafe in which they are carried.

R. I. V. Ball Bearings—The most important change in R. I. V. ball bearings for this year is that they are no longer a two-point ball bearing, but the inner and outer raceway groove is so curtailed that an arc of the ball bears direct upon both the inner and outer race. This gives a path for the ball to roll in and avoid side sway between the inner and outer race and so make the bearing satisfactory for use in front wheels where a thrust as well as radial load has to be taken care of. The ball-retainer is a split bronze ring made in halves with the halves riveted together. It is claimed that in the different types of R. I. V. annual ball bearings the balls occupy from 75 to 90 per cent of the annular space between the inner and outer races.

The Cataract Washer—This washer is used for cleaning the bodies of motor cars. It is, roughly speaking, a ball of looped mop yarn tied about the end of a short threaded nozzle. The nozzle end threads onto a hose so that in washing the water flows out through the hose and through the mop. This is the merit of the device.

Bullard's Malted Coffee—A desirable feature for motorists is what is known as malted coffee. It is a grey-colored powder which combines coffee and cream. To make a cup of coffee it is only necessary to put a spoonful or more into a cup of hot water and stir it less than a second. The coffee is immediately ready for use.

The Excelsior Carbureter—Made by the Excelsior Needle Co. This carbureter differs from the majority of others in that its poppet-type auxiliary air valve is controlled by a spring shaped like the mainspring in a watch. The valve stem lies horizontally across the carbureter and is threaded to mesh with a pinion which is on the same shaft as a large gear. This large gear in turn meshes with another pinion to which shaft is attached the spring. When the valve opens it winds up the spring by revolving the wheel just as a watch spring is unwound by driving the mechanisms. The use of this spring is claimed to prevent fluttering of the valve, which is the main object aimed at in the device. In other respects the carbureter is a conventional concentric-nozzle type, with an adjustable needle valve in the nozzle.

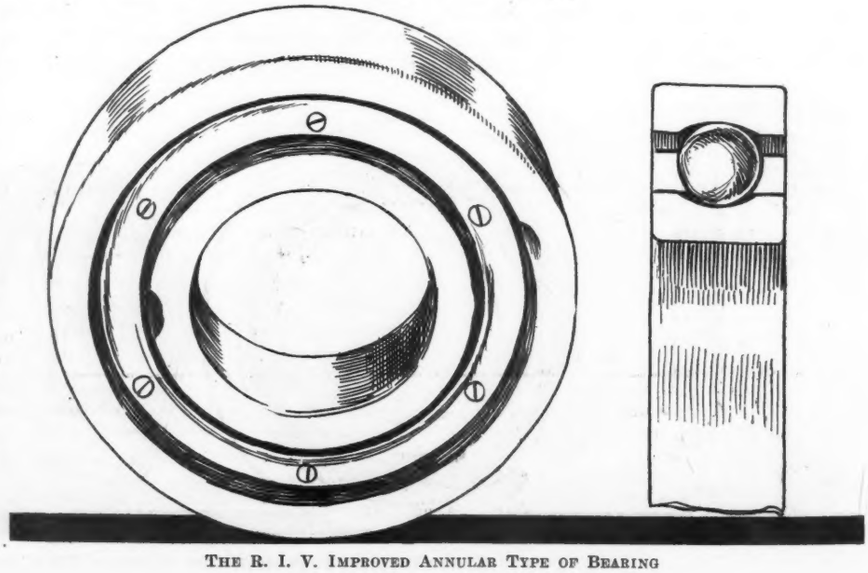
MAGNETO CONSTRUCTION

(Continued from page 59)

The Heinze low-tension magneto differs from the others in that it uses the round instead of the rectangular cross section magnets. The object is to make the magnets come into contact with the pole pieces, which is accomplished by grinding the ends of them and reaming holes in the pole pieces, so that the round ends of the magnets make perfect contact with the pole pieces.

The Briggs low-tension magneto uses a single armature winding and has both the armature and distributershaft carried on ball bearings. The circuit-breaker mechanism differs from that in the ordinary magneto in that the operative parts are located on a flat surface so that when the cover is removed access can be had both in front and at all sides. The breaker points are of radium platinum, the revolving cam is oiled through a wick which constantly bears upon it.

The Swiss magneto is a high-tension type having primary and secondary windings on the armature, which is carried on annular ball bearings. The breaker-box mechanism is on the rear end of the armatureshaft and the distributer is at the front end of the instrument. The visible spark gap is a practical feature of this instrument. It is located opposite the end of the distributershaft within the magneto arch. A defect in any of the plugs can be detected instantly, in that when breaks or disturbances occur in the spark plugs or wires leading to them the spark shorts over this gap.



THE R. I. V. IMPROVED ANNULAR TYPE OF BEARING

Milwaukee Boasts of Show Success

Attendance an Increase of 5000 Over Last Year—Cars to Value of $550,000 Are Reported to Have Been Sold

MILWAUKEE, WIS., Jan. 23—The third annual Milwaukee show established many new records for such expositions in Milwaukee. The attendance was 24,083 for 5 days and 6 evenings, or about 5,000 more than attended the 6-day show in 1910. Reliable figures gathered from exhibitors show that 180 cars actually were sold at the exhibits, the total value of these being $550,000. Forty orders for trucks were taken by exhibitors, with a total value of $100,000. The number of pleasure cars exhibited was 193, giving a ratio of sales of nearly one to one. Forty trucks sold against forty-four exhibited gives a like ratio.

So successful was the show that the Milwaukee Automobile Dealers' Association already has taken an option on the entire Auditorium for next year. The policy will remain practically unchanged, having been entirely satisfactory.

On Friday evening, the closing night of the show, the association, in coöperation with the Wisconsin State A. A. and Milwaukee A. C., entertained about forty members of the legislature. Upon the arrival from Madison the legislature were transported to the Hotel Pfister for dinner and then to the Auditorium. Many of them were enlisted in the cause of good roads, reasonable motor car legislation and other legislation as the result of the courtesy shown by the associations.

Electrobola Lights

One of the new electric lights for motor cars shown at Milwaukee was the Electrobola, made by the Avery Portable Light Co. Tungsten lamps of various sizes are used, with a 12-inch parabolic reflector for the headlight, giving safe illumination for a distance of about 700 feet. A distinctive feature is a set screw by which the point of light may be moved backward or forward in order to focus the light for different distances. The entire lamp and reflector is a casting made from magnesium and aluminum.

This company also makes a storage battery under the name Electrobola, specially for motor-car lighting purposes. This is a 6-volt 120-ampere hour battery, and the active elements are contained in hard-rubber cells in a wooden box.

Electric Star Headlight

Another electric headlight for motor car use is manufactured by the Milwaukee Bronze Casting Co. This is made in one complete casting, ground, and polished to the usual parabolic form. A combination reflector projects a ray of light which is mirrored and reflected in all directions, casting a diffused light over all the road with the intense light focused dead ahead. The casting is of aluminum, silvered. Bulbs ranging from 10 candlepower to 25 candlepower may be used. The lamps are finished in black enamel with brass finish and add very much to the appearance of the machine.

Oil Pumps and Tanks

In the line of equipment for public and private garages the Milwaukee Oil Pump and Tank Co. is showing some novel features. Its fireproof seamless tanks are equipped with continuous motion pumps which automatically measure the quantity of oil or gasoline which passes through them. A rotary pump is driven by means of gears when the handle is turned, and discharges a constant stream. There is the amount wanted and when that has been drawn the pump stops automatically, and will not pump any more until reset. The dials are usually made to read in gallons, although special ones can be had to meet various requirements.

Another Punctureless Tire

An exhibit that created a great deal of interest at the Milwaukee show is the Dahl punctureless tire, manufactured in Minneapolis. This tire consists of a resilient cushion or filler made principally of vegetable oils with which the outer casing is filled, and when filled is compressed in the casing by means of tools furnished with each set of tires. The filler is molded when made to exactly fit the different sizes of casings and can be used with any make of quick-detachable or Fisk tires. It takes the place of the inner tube. It is not a soft, gummy mixture, but is molded to fit the casing and is in substance much like rubber. It is claimed that the shock-absorbing qualities of this filler are substantially the same as a pneumatic tire and when properly installed upon a car has the same easy-riding qualities as the air tire. As for the wearing qualities of this filler, sections of tire were shown which had been in hard service for several months and showed no effects of their usage. These punctureless tires add from 50 to 150 pounds to the weight of the car, depending on the size of the wheels, but it is probable that the ordinary user would overlook this fact if it gives him an efficient substitute for air.

Arnold Electric Alarm

One of the newcomers is the Arnold electric alarm, shown by the Fair Mfg. Co., of Racine, Wis. This can be operated from the ignition batteries. As it requires only ⅞ ampere it does not appreciably deteriorate the batteries, it is claimed. The operating button on the Arnold alarm can be placed anywhere that convenience dictates, and when placed on the hand wheel does away entirely with the necessity for removing the hands from the wheel. The tone may be modulated to different pitches and is always clear and penetrating. The working mechanism is very simple, cannot easily get out of order, and does not even require oiling. In operation, a steel diaphragm is struck at the rate of several thousand taps per minute by a steel hammer actuated by electro magnets. The vibrations thus set up are magnified by a carefully designed horn and give a most effective warning.

Defender Tire Tread

A tire tread having some novel features, exhibited by the Fair Mfg. Co., of Racine, Wis., is made of heavy chrome leather reinforced with layers of strong cotton fabric to prevent stretching, and studded with special hardened center rivets. This stud has four prongs at its outer edge, which are soft metal so that they can be clinched over the leather. They are a part of a rim which fits over a cone-shaped hardened center. The latter takes the wear of the load, while the rim of softer metal holds it to its work. The principal feature of the tread is the method of attaching it to the wheel. Around each end of the tread are hooks of heavy wire which interlock around a complete circle. Heavy drawing wires are supplied for tightening and prevent clinching of the tread, so that it is a support to the tire while in action. The wires rest against the side of the tire and any tendency to creeping swings the wires forward upon their rivet hinges. This tends to tighten the lock and the cover. The side wires are so arranged that they form a truss around the entire length of the leather tread and yet allow perfect freedom of movement to each wire as it comes to the ground with the rotation of the wheel. Every fourth hook is left open for convenience in removing or mounting the tread. In putting on this tread the end of the tightening wire is drawn through and secured by ball thurst. The wire will pass through it freely in one direction, but is firmly gripped against any movement in the opposite direction, so that slipping of the tire inside the tread only tends to tighten it and make the device more effective.

Quakers Start Second Week's Show

Commercial Vehicles Now Have an Inning Following Session of Pleasure Cars Which Was the Most Successful Affair Ever Held in City of Philadelphia by the Dealers

PHILADELPHIA, Pa., Jan. 21—Attended by crowds that only were limited by the capacity of the two big armories, the first week of Philadelphia's tenth annual show came to an end tonight. Having had their innings and been the cynosure of all eyes for a week, the gasoline pleasure cars now give way to the electrics and to the commercial trucks and vehicles.

The accessories exhibit, greatly added to since the opening last Saturday night, remains, it having been considered of sufficient importance to be carried throughout the 2 weeks. The closing of the first week brings an end to the double show, the scene shifting exclusively to the Third Regiment armory, Broad and Wharton streets. This year's display was admittedly the most pretentious one ever held here, and interest is still keen, a fact that augurs well for the second week. There is no doubt but that at the conclusion of the show next Saturday night a comparison of notes will find that financially, in number of sales made and in attendance it will easily outdistance its predecessors.

A fact worthy of observation at this week's exhibition has been the large number of sightseers attending—that is to say, persons who don't own cars or who haven't any immediate prospects of being owners, but who if the time ever comes when such an event occurs, surely will be qualified to speak with authority on the subject, for no detail was too small to be overlooked and the willing salesmen were kept constantly busy explaining the points of superiority in their respective cars.

Although the formal opening of the show took place Saturday night, Monday marked the real opening, for on that day exhibits which had formed a feature of the Madison Square garden show were shipped here Sunday and installed. Chief in interest for curiosity-seekers were trophies that told of gruelling races and lightning speed on track and road.

Broad Street Dresses Up

Broad street put on gala attire in honor of the show and presents a most attractive appearance, particularly in that section north of the city hall, wherein is situated the row, vari-colored bunting and flags adorning the numerous structures, the auxiliary exhibits of those companies necessarily barred from the armories by reason of this year's show being composed exclusively of licensed cars being invitingly on display.

Occupying more than ordinary portion of the spotlight at the present time, naturally the Otto and the Ford cars are the object of a great deal of attention. The 1911 models displayed at the local branch offices of the Ford Motor Car Co. daily draw crowds. The Fanning Motor Car Co. is conducting a private show at Broad and Race streets, where a line of the Bergdoll car, a Philadelphia product, is offered. Another individual show is that of the Alpena Motor Car Co., of Alpena, Mich., a newcomer, the Eastern Motor Sales Co. eastern distributer, with temporarily-estabilshed headquarters at 1510 Chestnut street. Indeed, there is not a make but that is bedecked with frills and on dress parade, and the number of private exhibits is too long for enumeration. Suffice to say, motoring interest is at its height, and with weather conditions that have been ideal, each has drawn more than an ordinary meed of attention.

Thirty-one in First Armory

At the First Regiment armory, Broad and Callowhill streets, a total of thirty-one separate makes were on view. The lack of sufficiently large building prevented the exhibition from being confined to one structure, but a free motor bus service between the two armories quickly transported patrons from one to the other.

The number of different makes on show at the Third Regiment armory was slightly less than at the First, but what was lacking in quantity was made up in quality. Here were housed all the higher-priced cars. The exhibits numbered twenty-three.

A sharp contrast to the present week's scene will be presented when the doors of the Third regiment open on Monday at noon. Trucks of every conceivable size, shape and capacity will share attention with the silently-moving and graceful electric cars, a comprehensive exhibit of both branches being shown. The following are the exhibits in the commercial vehicle section: Alco, Autocar, Alden-Sampson, Baker, Brush, Commercial, Garford, Knox, Mack, Packard, Peerless, Pierce-Arrow, Reo, Waverley, White.

The electrics' division consists of: Babcock, Baker, Detroit, Rauch & Lang, Studebaker, Waverley, Woods.

TAKES OVER AMERICAN PLANT

Indianapolis, Ind., Jan. 23—A deal was completed Saturday, whereby the newly organized American Motors Co. takes over the property and business of the American Motor Car Co. The negotiations have been carried on very quietly, and no announcement was made of the deal until the articles of incorporation of the new company were filed with the secretary of state.

The new company has an authorized capitalization of $1,050,000, making it one of the strongest of the local motor car manufacturing concerns. It has a well equipped plant at Illinois and Henry streets, and it is understood there are to be no drastic changes in the well-known American policy.

J. I. Handley of New York city is president and the principal stockholder in the new company. He was formerly vice-president of the United States Motor Co., and made his debut in the motor car business at Dallas, Tex. He will move to Indianapolis at once to devote his attention to the construction of the American.

Other directors of the new company are A. D. Ogborn, Newcastle; J. E. Kepperley,

Motor Peace Prevails In England

LONDON, Jan. 14—Two of the most important motor organizations in the United Kingdom—the Automobile Association and the Motor Union—have amalgamated, and the fusion affects some 26,000 motorists, 18,000 having been members of the A. A. and 8,000 being old Motor Unionists.

The Automobile Association has had a remarkable career. Founded some 5 years ago, it has developed into an enormous institution, the chief cause of its great popularity being the scout system, whereby the roads of the United Kingdom are patrolled, and the whereabouts of police traps ascertained.

The Motor Union is an older body, and is chiefly concerned with a free legal defence. scheme for its members. A few years back the alliance existing between the Royal Automobile Club and the Motor Union was broken. Soon after its separation from the Royal Automobile Club, the Motor Union engaged in a bitter war with the Automobile Association, but eventually the disputants settled down and now the two bodies have joined forces.

Extraordinary general meetings of the A. A. and of the M. U. were held at the Hotel Cecil for the purpose of confirming the action of the committees in respect to the amalgamation.

In presiding over the Motor Union meeting, Joynson Hicks expressed the hope that eventually the interests of motorists would be looked after by one big body, or that a national council would be formed. He declared that the committee of the allied organization, which was to be known as the Automobile Association and Motor Union, would consists of sixteen members, eight from each of the uniting bodies. The badge has been formed by verging the old M. U. badge with that of the old A. A.

Detroit Clamors for a Show Building

Recent Exhibition of Cars Points Out Needs of the City and Aldermen Start a Movement to Secure Edifice Large Enough to Accomodate Future Exhibitions of All Kinds

DETROIT, MICH., Jan. 23—Detroit's two shows—the fourth annual exhibit of the Detroit Automobile Dealers' Association and the first annual display of the United Automobile Manufacturers' and Dealers' Association—closed Saturday night, after one of the most memorable weeks in the history of the local motor industry. The promoters of both enterprises express themselves as well pleased with the results, immediate and prospective, for some of them promise to be very far-reaching. Viewed from any angle, the shows, or the show, if the United display is to be considered in the light of an overflow, was a pronounced success.

Naturally there has followed in the wake of the show many an extravagant tale as to the number of cars sold, the agencies placed and the contracts closed. One estimate places the aggregate sales for the week at close to three-quarters of a million dollars, which, of course, is an exaggeration. To attempt to give any accurate figures as to the amount of business actually done would be impossible at this time; but the claims made by the various exhibitors are, in many instances, based on facts, and it is safe to say that, from a sales standpoint, all previous local show records were broken.

Never was keener interest displayed by the public. Formerly the average spectator would saunter through the hall, survey the cars in a general way and see all he wanted to see in an hour or less. This year he came to study the cars, to compare them and to hear the salesmen expound the superior qualities of this or that model.

The total attendance for the two shows is estimated at upwards of 100,000. The paid admissions to the D. A. D. A. display were in excess of 25,000, while the total attendance here was probably more than 50,000. No admission was charged to the United show.

As one result of the United show, the United Automobile Dealers' and Manufacturers' Association, hastily formed by a few of the disappointed applicants for space at the D. A. D. A. exhibit, probably will become a permanent organization and the United show an annual event. There is some agitation among the members for another exhibit in March, to mark the opening of the spring season, and the proposition has met considerable encouragement.

The lack of space in the Wayne pavilion, the largest public hall in the city, sufficient to accommodate a thoroughly representative show, has led to a revival of the movement to secure for Detroit a mammoth auditorium, commensurate with the city's importance as a convention city. Members of the Detroit common council were guests of the D. A. D. A. at the pavilion Wednesday night when the necessity of such a building was pointed out to them. The aldermen were duly impressed and expressed themselves as being heartily in sympathy with any effort that might be made to secure an auditorium.

Alderman Louis Brozo has announced that he will introduce in the council tomorrow night a resolution looking toward the bonding of the city for the purchase of a site. His plan contemplates that the funds for the building itself shall be raised by private subscriptions, as has been done in some other cities.

Indianapolis; V. A. Longaker, Indianapolis; D. S. Menasco, Indianapolis. Mr. Longaker, who was president of the American Motor Car Co., will be chairman of the board of directors, and Mr. Menasco, who was secretary and treasurer of the old concern, will be vice-president of the new. The new company expects to undertake an aggressive advertising campaign throughout the country from now on.

TEXAS' IDEA OF IT

Austin, Tex., Jan. 22—It is probable that the legislature at its present session will enact a law prohibiting motor car racing on any other than a straightaway track. Bills containing this provision are pending in the senate and house, the one in the former body being introduced by Senator Robert L. Warren, of Terrelle, and in the house by Representative H. B. Savage, of Belton. It is claimed that by using a straight track danger of accident will almost be eliminated. Mr. Warren's bill makes it a misdemeanor to drive a motor car upon a circular or elliptical race track at a greater rate of speed than 30 miles an hour.

This provision, of course, makes racing out of the question. His measure also provides that motor cars shall not be operated upon any public road, street or driveway at a greater rate of speed than 18 miles an hour. The bills give the right to cities and towns to regulate by ordinance the maximum speed at which motor cars shall be operated in their respective corporate limits. Another feature of Mr. Warren's bill is that which requires all motor cars to be equipped with appliances that shall give warnings every 300 feet. It is further provided that all cars shall carry lights from 1 hour after sundown to 1 hour before sunrise.

Wilcox Takes Speedway Honors

LOS ANGELES, Cal, Jan. 22—Special telegram—De Palma was forced to share the honors of the postponed motordrome race with Howard Wilcox this afternoon, the big National six being 4-5 second faster to the mile than a week ago. The Simplex, National and Fiat met in the record trials, 5 and 10-mile free-for-all and the handicap. The National showed the fastest mile, 39 seconds. De Palma was 2-5 second slower.

In the 5-mile race, Wilcox won handily from Dearborn in the Fiat, de Palma taking third. A bad rear tire forced Wilcox to slow up toward the end of the 10-mile race and de Palma, by taking bigger chances, won in 6:54. The time made was slower than that of the meet last April. In the handicap the National once more fought it out with De Palma and won by a good margin.

In the 5-mile event for cars under 600 cubic inches piston displacement Nikrent, in the Knox six, established a new speedway record for the class, doing 3:38 2-5.

Wilcox in the National 40 won the 50-mile race with Merz and the other National second. L. Nikrent in the Buick was the only other car running at the finish. Five thousand people saw the racing. Summary:

One-mile record trials—H. Wilcox, National six, :39; dePalma, Simplex, :39 2-5; Dearborn, Fiat, :40.

Five-mile, free-for-all, class D.—Wilcox, National six, won; Dearborn, Fiat, 2; dePalma, Simplex, 3; time, 3:21.

Five-mile, 600 cubic inches and under, class C.—J. Nikrent, Knox six, won; Wilcox, National, 2; time, 3:38 2-5.

Ten-mile, free-for-all, class D.—DePalma, Simplex, won; Wilcox, National six, 2; Dearborn, Fiat, 3; time, 6:54.

Five-mile, free-for-all, handicap—Wilcox, National six, won; dePalma, Simplex, 2; Nikrent, Knox six, 3; time, 3:42 4-5.

Fifty miles, 600 cubic inches and under, class C.—Wilcox, National, won; Merz, National, 2; L. Nikrent, Buick, 3; time, 3:45 4-5, 7:30, 11:14, 15:51 2-5, 19:19 2-5, 23:31 3-5, 27:46, 32:06 1-5, 36:22 2-5, 40:23 4-5.

ARTHUR JERVIS DEAD

New York, Jan. 24—Arthur N. Jervis, advertising manager of the motor car department of the American Locomotive Co., died at the Carlton hotel Monday morning following an attack of pneumonia. The funeral was held today and largely attended. Mr. Jervis was one of the leading motor writers and before taking his position with the Alco he was motor editor of the New York Sun and later editor of Automobile Topics. He was unmarried and leaves an aged mother. His descriptive work in contests will long be remembered as among the motor classics.

The Readers' Clearing House

EDITOR'S NOTE—In this department Motor Age answers free of charge questions regarding motor problems, and invites the discussion of pertinent subjects. Correspondence is solicited from subscribers and others. All communications must be properly signed, and should the writer not wish his name to appear, he may use any nom de plume desired.

WHY FRONT PUSHRODS WEAR

YATES CENTER, Kan.—Editor Motor Age—I read with interest the inquiry of E. G. Mertens, of Glens Falls, N. Y., in Motor Age, issue January 19, as I too have often noticed the greater wear in the forward pushrod of different four and six-cylinder motors, especially the L and T-type, enclosed. I believe that the difference in wear is caused not by a lack of lubrication, as suggested by Motor Age, but to the fact that the forward springs retain their initial strength longer, due to their proximity to the fan. These stronger springs would, of course, cause more pressure and resultingly more wear.—Charles E. Lewis.

AUXILIARY AIR CONTROL

Tacoma, Wash.—Editor Motor Age—A good device for an auxiliary air control can be applied to any car with but little trouble. Cut an opening in the intake pipe between the carbureter and the engine, and cover it with a butterfly valve somewhat after the pattern of the valve used in the Schebler carbureter. This must be arranged so that it may be opened or closed by a lever on the steering column or some other place handy to the driver. Care should be taken that it be air-tight when closed otherwise it will be necessary to change the adjustment of the carbureter. With a little experience on the road, the driver will soon learn the engine speed at which he can begin to open this extra air inlet. If he has never before driven a car equipped with this arrangement, he will be amazed at the extent to which it can be opened before the engine will miss fire, indicating a weak mixture. When descending a long hill, a suitable gear may be engaged, the throttle closed, the spark switched off and the extra air-port opened to its greatest extent. In this way cool air is drawn into the engine on every suction stroke, cooling the engine and cleaning the spark plugs. The drawing, Fig. 1, will help to explain.—R. M. C.

BORAX FOR BRAZING

Champlain, N. Y.—Editor Motor Age—I have a brazer and I use borax powder, and it doesn't make clean work. It gets all gummy. Could Motor Age tell me of any liquid that I could use to make cleaner work?—P. L.

Borax powder is universally used for brazing purposes and comparatively clean work can be done with it if properly handled. A good workman will have the work thoroughly cleaned, and apply the flux or borax only around the joints to be brazed, while a poor workman cleans the parts all over in the neighborhood of the joints, but neglects to thoroughly clean the surfaces of the joints themselves; then, in the operation of brazing, he sprinkles a large amount of borax and spelter all over the parts instead of applying just enough and in the proper place. By dipping the brazed parts in cold water

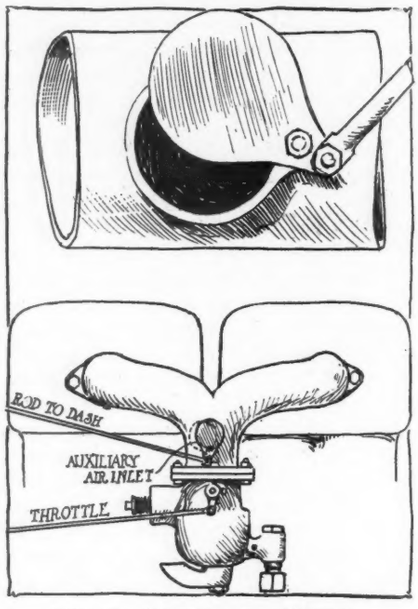


FIG. 1—AUXILIARY AIR CONTROL

immediately after brazing and while still hot the scale of the flux is generally cracked off or at least loosened.

Brazing is soldering with hard solder. Hard solder is an alloy of copper and zinc, consists of brass filings or chips, and is commonly called spelter. Flux is a substance or mixture used to promote the fusion of metals or minerals. In order to secure the perfect union of metal bodies with brass as the agent of combination, heat and flux are the other essentials, and there are also a number of conditions which are quite as important. First, the parts to be united must be thoroughly clean about the joints, in close contact with each other, and should be securely held together with rivets, clamps, wire or some other means, in order that proper alignment may be maintained throughout the process. Second, the job must be properly heated, the flux and solder carefully distributed, and all operations performed at the proper time.

In Fig. 2, for example, part of the operation of brazing a flange to a section of tubing is illustrated. This job was on the water-manifold of a motor car and, owing to the necessary bends in the tubing, it was required that the flange be in a certain position relative to the length of the manifold and its position on the motor. For this reason, after the manifold had been cut off to the proper length, it was assembled onto the motor with the end to be brazed resting loose in the flange and arranged in its ultimate relation.

In this position the tubing and flange were carefully marked with a scratch awl; one mark being drawn around the circumference of the tubing and the other at right angles to it, half on the flange and half on the tubing, so that they both intersected at the same point on the line drawn around the circumference of the manifold. The flange and tubing were then removed and thoroughly cleaned up with emery-cloth where the joint was to take place. Care was taken, however, not to eradicate the marks. Then the flange was slipped onto the manifold so that the marks lined up properly and four holes were drilled at convenient intervals through the boss on the flange and the tubing, and the two firmly riveted together.

Now, in order that the work be neat and to prevent the flux and spelter from running all over the flange, a trough was made around the joint with a composition consisting of a mixture of shredded asbestos and asbestos glue, or asbestos cement. The flux used in this case was a mixture of borax and boracic acid, and a small amount was mixed with water to form a paste and applied to the joint with a stick. The end which was to be held in the hand was then stuffed up with waste to prevent the heat from flowing up through the tubing; the job was next placed over a charcoal fire; some of the larger pieces of charcoal were built up around it, and the flanged end slowly heated. When it began to take on a light

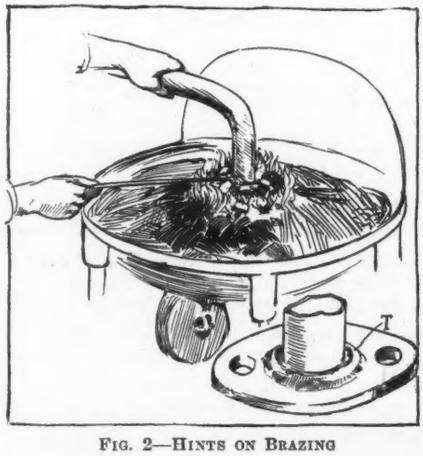


FIG. 2—HINTS ON BRAZING

Motoring Questions Answered

red color a light steel rod with the tip flattened out and bent almost at right angles was also placed in the fire. In a few seconds both the end of the rod and the job had become heated to a light red color; the tip of the rod was removed from the fire and a small amount of the flux powder was scooped up with the flat or spatulated portion and applied to the job.

Two or three doses of the flux applied in this way and carefully distributed were sufficient. The spelter was applied immediately afterward in the same manner; it melted and flowed readily, and as soon as it had flowed all around the joint the job was removed from the fire and allowed to cool. The asbestos trough was easily struck off when the job had become cold.

KANSAS CITY TO JACKSONVILLE

Industry, Kan.—Editor Motor Age—Kindly answer through the Readers' Clearing House the following questions:

1—Does the General Motors Co. manufacture the Buick cars? Please give me its address.

2—Kindly give me the best route from Kansas City, Mo., to Jacksonville, Fla., and state the distance.—S. W. Schenberger.

1—The Buick cars are manufactured by the Buick Motor Co., Flint, Mich. This company is of the General Motors Co., which is a holding corporation with headquarters at Detroit, Mich.

2—From Kansas City to St. Louis pass through Independence, Blue Springs, Oak Grove, Odessa, Higginsville, Corder, Blackburn, Shackleford, Marshall, Slater, Glasgow, Armstrong, Higbee, Clark, Mexico, Martinsburg, Wellsville, New Florence, Jonesburg, Warrenton, Wright City, Wentzville and St. Charles. Continuing on from St. Louis to Louisville, tour through Belleville, Shiloh, Lebanon, Trenton, Breeze, Carlyle, Salem, Flora, Noble, Olney, Lawrenceville, Vincennes, Wheatland, Washington, Montgomery, Cannelburg, Loogootee, Shoals, Huron, Mitchell, Orleans, Paoli, Hardinsburg, Fredericksburg, Palmyra, Greenville, Galena, Mooresville and New Albany. Following through Buechel, Thixton, Smithville, Cox Creek, Balltown, New Haven, Athertonville, Buffalo, Magnolia, Pikeview, Canmer, Hardville, Uno, Bear Wallow, Cave City, Glasgow Junction, Bowling Green, Franklin, Mitchell, Mulloys, White House, Millersville, Goodlettsville, Nashville, Murfreesboro, Fayetteville, Huntsville, Scottsboro, Bridgeport, Kasper, Chattanooga, Lafayette, Rome, Cartersville, Marietta, Atlanta, Jonesboro, Griffin, Barnsville, Forsyth, to Macon. From Macon to Jacksonville you have a choice of going by way of Savannah, which is Jeffersonville, Dublin, Swainsboro, Statesboro, Eden, Savannah, Riceboro, Darien, Brunswick, Owens Ferry, Kings Ferry and Jacksonville; or, from Macon to Hawkinsville, Abbeville, Fitzgerald, Douglas, Waycross and Jacksonville.

MEASURING TANK CAPACITY

North Washington, Pa.—Editor Motor Age—Can Motor Age give me a formula for figuring the capacity of a storage tank which is 20 feet long and 4 feet in diameter? I fill the tank in the cap and want to be able to gauge through the cap in the top of the tank.

2—I should like to know where I can get a good book on refining crude oil.

3—Is 92 degrees gasoline too high for a motor car? I made this from natural gas.—H. J. Strance.

1—The formula for figuring the capacity of any cylindrical tank is:

$$0.7854 \times D^2 \times L = \text{Capacity.}$$

This is equivalent to $0.7854 \times D^2$, the diameter of the cylinder multiplied by itself, $\times$ L, the length of the cylinder or tank. Thus if your tank is 4 feet in diameter and 20 feet long, substituting these dimensions in the formula you would get: $0.7854 \times 16 = 12.5664$, square feet, $\times$ 20 = 25.1328, cubic feet. I gallon = 231 cubic inches $= \frac{\text{1 cubic foot}}{7.4805} = 0.13368$ cubic feet.

Therefore, $\frac{25.1328}{0.13368} = 1880$, the capacity of the tank in gallons, approximately. Figure 3 will aid you in providing yourself with facilities for approximating the amount of gasoline in your tank at certain levels. Motor Age has computed for you the approximate amounts of gasoline in the tank at each level of 4 inches, and you may provide yourself with a broom handle or stick and graduate it as indicated by the figures in the drawing, then all you will have to do to ascertain the amount of gasoline in the tank will be to pass the graduated stick straight down through the filler cap as indicated, lift it out again and the stick will be wet up to or nearly up to the figure indicating the amount of liquid in the tank.

EDITOR'S NOTE—To the Readers of the Clearing House columns: Motor Age insists on having bona fide signatures to all communications published in this department. It has been discovered that the proper signature has not been given on many communications, and Motor Age will not publish such communications, and will take steps to hunt down the offenders of this rule if it is violated.

The diagram shows the amount of gasoline for every 4 inches of depth, and it will be noticed that there is considerable more gasoline in a 4-inch level near the center of the tank than in the levels near the top or bottom. When a graduated stick shows a level of 4 inches of fuel in the tank, the tank contains 72 gallons.

2—The subject of refining crude petroleum is very clearly described in Thorpe's industrial Chemistry, which may be found at almost any library, or purchased from almost any of the larger book dealers. The latest and perhaps the best work on the subject is "Crude Petroleum and Its Products," by Boverton Redwood, published by Charles Griffin & Co., Ltd., London, Eng., and also obtainable from McClurg's, Chicago, or perhaps any of the other large dealers.

3—Gasoline testing 92 degrees Beaume should work very nicely if it were possible to keep it in storage and obtain it easily. Gasoline so light, however, is almost a gas and evaporates so readily that its use in motor cars would be quite impracticable. It would be too costly for ordinary use; would not give any more power than the ordinary gasoline now in use, except at low speeds; and it would be comparatively dangerous to handle.

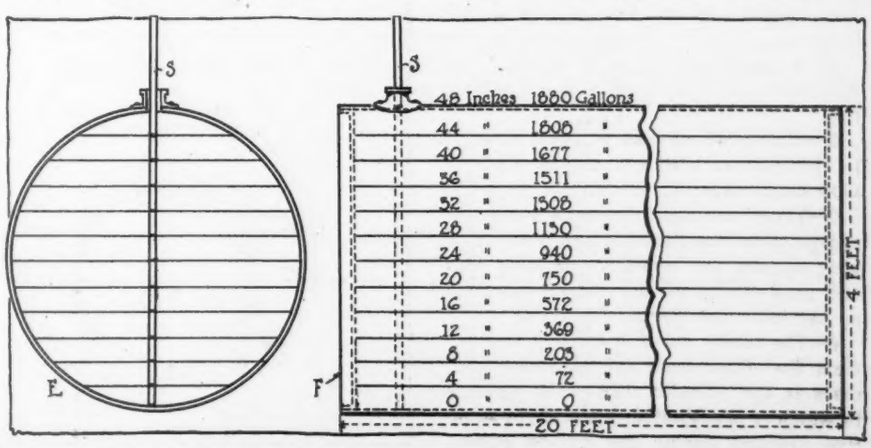


FIG. 3—SHOWING QUANTITIES OF FUEL IN TANK AT GRADUATED LEVELS

Some of the Novelties Which Are Found in Valve Systems

Editor's Note—The following paper on "Novelties in Valve Systems" was read at the recent meeting of the Society of Automobile Engineers by E. P. Batzell.

IN THE writer's paper, read at the S. A. E. summer meeting, a number of different types of valve arrangements brought forth to compete with the poppet valve were represented and discussed. During the last few months there have appeared some new valve systems, comprising among them also several constructions embodying in their valve gear a combination of valve types formerly known and applied separately. In regard to these there can be expressed a presumption that inventors found it hard to work the field seeking new original valve types, and started to combine older ones in one or the other way. As a result, the constructions became more and more complicated, and to redeem this it is necessary to make claims as to their great superiority over the others, simpler arrangements. Only a few of such combination valve systems are represented below, but it does not make it a hard problem to put different valve types together in some other manner.

Combination Rotary and Poppet Valve

Probably the most interesting of the combination valve systems is represented in Fig. 1. This system has been recently described in a number of trade papers, but for completeness a short description of it is also desirable here. It is a combination of rotary and poppet valve. The single poppet valve A is held to its seat B by the spring C. Inside the seat B is located the rotary valve D of cylindrical form, the central part F of which serves as guide for the poppet valve stem G. The cylindrical inlet port is I and the exhaust E. The rest of the drawing clearly shows the method employed to secure combined operation of the poppet and the rotary valve. The timing of both valves is represented in Fig. 2, the exhaust duration being 231 degrees and that of the inlet 198 degrees of crankshaft movement. The port in the rotary valve extends about 114 degrees over its circumference, and the inlet and exhaust ports in the cylinder head each occupy about 80 degrees.

The claims made in favor of this system, as given in the Autocar, are as follows:

1—A single poppet valve of large size will insure ample opening with a minimum lift.

2—The induction and exhaust passages in the cylinder head can also be made of very ample area.

3—These two facts insure a rapid discharge of exhaust, resulting in a cool running engine, and similarly an easy flow and good charge of mixture are obtained on the induction stroke.

4—The rotary valve is entirely shielded from the compression and explosion pressures in the cylinder. The only pressure to which it is subjected is the slight negative pressure during the suction stroke. As lubrication of the rotary valve does not seem to present any difficulties, there ought to be no wear to speak of.

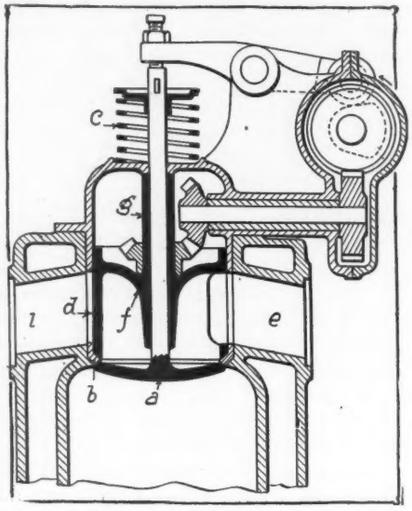


FIG. 1—COMBINATION ROTARY AND POPPET VALVE

5—As the poppet valve remains open twice as long as is the case with the ordinary arrangement of two for each cylinder, and as the lift is less than half, it follows that the action must be much quieter and sweeter, and that wear and tear will be lessened accordingly.

Analysis of Claims

In regard to these claims the following analysis can be made: To get the full advantage of port size in this system, the minimum lift of the poppet valve will have to be determined under consideration that the greatest openings of both valves be equal. It can be assumed that a motor with a 5-inch bore has a rotary valve of 3½-inch outside diameter and a poppet valve with 3⅛-inch clear diameter. The cylinder port openings which register with the rotary valve might be of rectangular section 1 inch high and extending, as said, over 80 degrees, having an area of about 3 square inches. Consequently, the poppet valve has to have a lift of about $\frac{3}{16}$ inch. Again, to get all the advantage from a large size of valve opening the poppet valve should not start to close the inlet before the moment when the cylinder port has been completely uncovered by the rotary valve. Referring to position 3 in Fig. 2, stating that the rotary valve opens the induction, and considering that 80 degrees of its motion is required to attain the maximum port size, it will be found that during but 114°—80°=34°, counting half crankshaft time, the poppet valve should close. On the other hand, in an ordinary poppet valve motor with the same opening duration, the corresponding time of valve closing will be 44½ degrees, or about 30 per cent of the total time slower. This rejects the claim made as to quieter and smoother valve action.

The shape of the respective inlet opening curve A in Fig. 3 is of a different character, comparing with valve systems described in the writer's former paper. The curve A is unsymmetrical, reaching its maximum quite late. Its rise is more gradual than with some other systems, but its drop is quicker. Concerning the inlet, a reversed form of curve should be preferred.

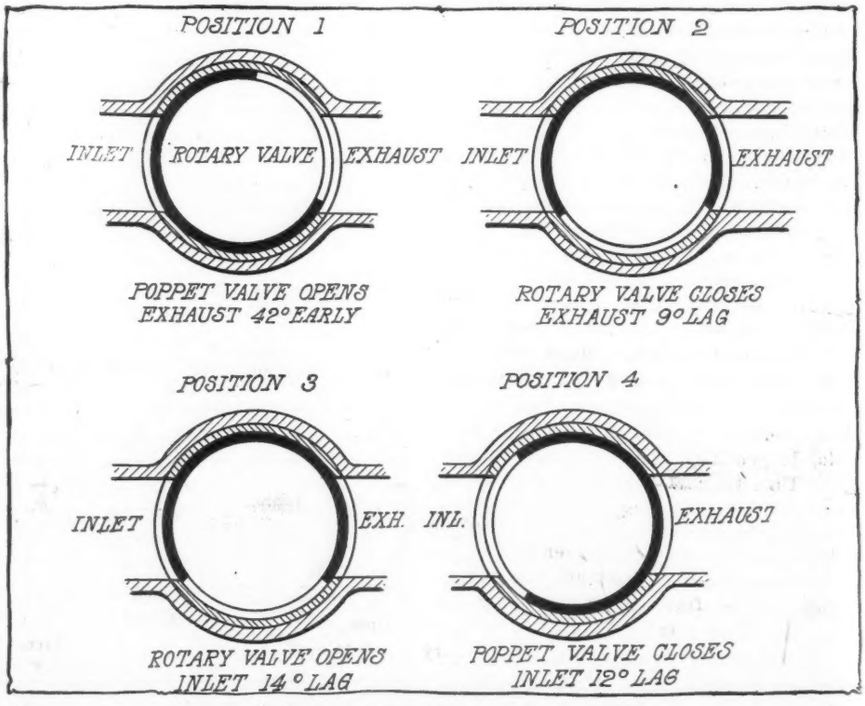


FIG. 2—TIMING OF VALVE SYSTEM SHOWN IN FIG. 1

Less unfavorable is the exhaust. It is started by opening the poppet valve, which reaches its full lift during about 35½ degrees of half-time motion, as compared with 57¾ degrees for an ordinary poppet valve. This quick exhaust opening really allows a quick and free escape of the burned gases. But with proper cam shape a similar quick opening, although of smaller total size, could be obtained in an ordinary poppet valve motor also.

The above-mentioned induces one to believe somewhat differently from what is stated in the claims accompanying the construction. However, some of its good features cannot be denied, and it might prove to be very reliable if applied in practice. A proper development of the oiling system for the rotary valve is not to be solved easily in such a manner as to prevent the oil from entering into the motor cylinder and the gas passages. A particularly bad feature of the system is the leading of intake and exhaust gases through the same chamber which is formed inside the rotary valve. In the foregoing example the volume of the chamber is about 9 cubic inches. With the motor having a 6-inch stroke, its piston displacement is 118 cubic inches, and its compression space of 25 per cent of the total cylinder is about 39.5 cubic inches. During the induction stroke the 9 cubic inches of spent gases left in the valve chamber from the previous exhaust will be carried into the cylinder, thus increasing about 22 per cent the amount of spent gases contained in the explosive mixture. After the inlet, the space of 9 cubic inches is filled up by fresh gases, which are expelled wastefully during the following exhaust. For the chosen size of motor this will increase its fuel consumption about 10 per cent.

General Valve Action

If it were not for the cited disadvantages in connection with a large chamber inside the rotary valve, the general valve action of the motor could be improved over that of the example taken. For instance, the same maximum size of a 3-square inch inlet opening could be obtained with a cylinder port 1½ inches high extending only 70 degrees over the rotary valve circumference. Retaining the 114 degrees extension of the port through the rotary valve, the difference 114°—70°=44° would be left as time of duration for the poppet valve to close. This figure is about equal to that of an ordinary poppet valve. The shape of inlet opening curve also would be somewhat improved—B in Fig. 3. However, these improvements are connected with an increase to 13 cubic inches of the chamber inside the rotary valve, due to higher ports therethrough. The volume of spent gases in the explosive mixture would be increased 31 per cent over that in systems with separate inlet and exhaust passages. The fuel consumption would increase 15 per cent. In consideration of the above losses, the shape of rotary valve as represented in Fig. 1 is a most

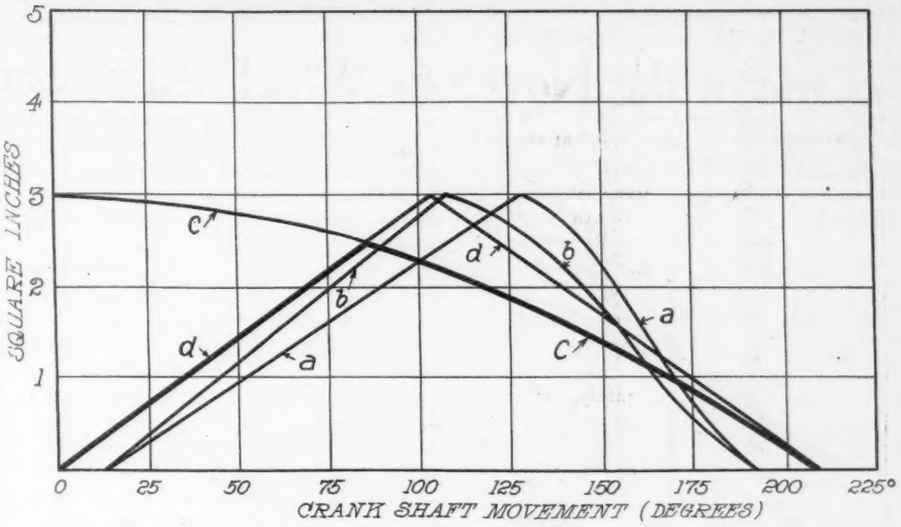


FIG. 3—INLET OPENING CURVES

unfavorable one. It could be improved by reducing the volume of the chamber inside of it. The losses will be decreased, though not eliminated.

In Fig. 4 another valve combination is represented, comprising automatically acting inlet and exhaust poppet valves and a single sleeve valve. The action of it is as follows: At the beginning of the motor suction stroke ports A in the sleeve valve B are open and gas is admitted into the cylinder through the automatic inlet valve I. During the induction period the sleeve B starts an upward motion, being operated from a half-time shaft C by means of a connecting rod D. At the end of induction the ports A become hidden in the cylinder head, which cuts off this period. The sleeve B continues its motion up and afterwards down, so as to start again to uncover ports A at the time of exhaust beginning. The pressure inside the cylinder forces the exhaust valve E open, allowing the gases to escape during the whole scavenging stroke. The alleged idea of this construction is to shield the poppet valves from high pressure and temperature and to get large valve openings, together with simplicity of mechanism.

The opening character cannot be analyzed exactly, on account of the automatic valve action. Some figures relating to the sleeve valve timing are of interest. If its ports close the inlet with a 20-degree lag, and open the exhaust 40 degrees early, then the time between is 300 degrees, counting upon the crankshaft. The combined inlet and exhaust time will be the balance of 720 degrees, or 420 degrees, during which the valve port a remains open. Its maximum opening is reached at the middle of this period, viz., 210 degrees after exhaust beginning. with an exhaust lasting 220 degrees, it will be found that the sleeve B has traveled 10 degrees on its upward motion at the time when the inlet should start to open, respectively, when the piston starts its downward stroke. Thus the size of inlet opening given by the sleeve ports will decrease with the continued suction stroke. On the contrary, the automatic inlet valve I opens more and more, due to increase of suction caused by the rising piston velocity. Consequently, there will be a moment somewhere between the extreme piston positions, when the port areas of both valves reach an equal figure. This port area has to be considered as the maximum for the inlet. Contrary to the figuring of the inventor, this maximum port area will be much less than the area of ports a through the sleeve, and generally the automatic inlet valve does not open quickly, and the less quickly it opens the less will be the inlet port area maximum. Its value will be variable, depending on the conditions under which the motor works.

Against the provisions made for the exhaust in the above construction, it can be mentioned that the automatic exhaust valve leaves a certain pressure above atmospheric inside the cylinder, after completion of the scavenging stroke. Investigating this point by means of a common indicator diagram, it will be found that with increase of this remaining pressure is required a longer piston travel on the suction stroke before the fresh charge can be taken into the cylinder. This results in a decrease of fresh charge quantity drawn in, together with an increase of the relative amount of spent gases mixed with it. The explosive mixture will be bad and the motor will have a low efficiency.

Combined Rotary and Sleeve Valves

The valve arrangement represented in Fig. 5 differs from that of Fig. 4 only in that rotary or oscillating barrel valves are used in place of the automatic inlet and exhaust valves of the latter. Let the change of sleeve valve port size during the inlet be represented by curve C in Fig. 3, and the lines D in the same figure correspond to the opening of the inlet rotary valve I in Fig. 5. The real shape of the opening curve with this valve com-

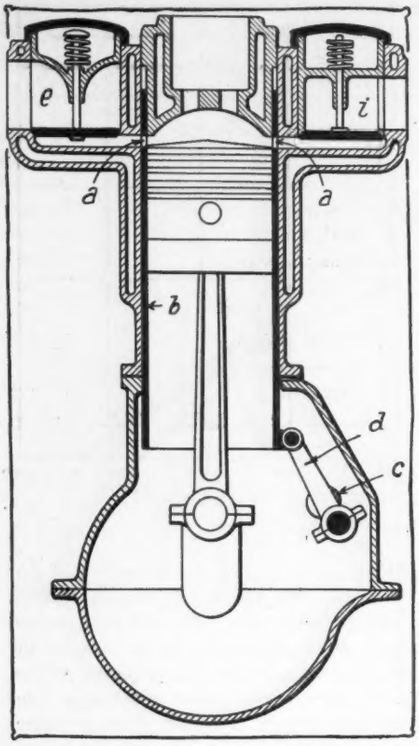


FIG. 4—COMBINATION OF AUTOMATIC POPPET AND SLEEVE VALVES

bination will be represented by the starting part of line D until its intersection with curve C, after which it follows the latter. This resulting combination opening curve is shown in Fig. 3 by heavy lines. Its insufficient shape proportion is easily noticed, particularly if compared with that of the rotary valve, and needs no further explanation.

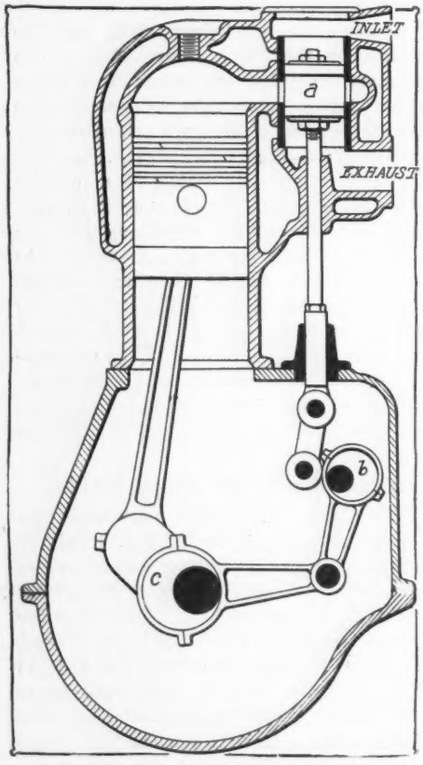


FIG. 6—SINGLE PISTON VALVE MOTOR

Neither Fig. 4 nor Fig. 5 arrangements can be considered successful in any respect. The sleeve valve generally carries many strong objections against its use, and thus these objections become applicable also against the above constructions. The advantage of a favorable valve opening, which is being obtained with common rotary valves, is lost in the construction of Fig. 5 on the greatest part of the induction stroke. Mechanical complication is increased. As to the main object of these constructions, the shielding of the outer valves, this appears to be solved entirely in the wrong way. Poppet valves with a proper seat and stem cooling are more apt to withstand temperatures than the sleeve valve. In regard to rotary valves this still cannot be stated positively, although even the little work done with this type induces one to not believe them less reliable than the sleeve valve. Properly constructed they will do the work under any heat conditions at present used in connection with motor car motors.

Single Piston Valve Motor

Ending this discussion of combination valve systems, it might still be proper to mention some new valve arrangements not belonging to the combination type but embodying quite interesting ideas. Fig. 6 shows the general scheme of a single piston valve motor. The use of a single piston valve A for inlet and exhaust has been made possible in this construction by operating the valve through the compound motion of two eccentrics B and C. The interconnection of these eccentrics is such that during the latter part of the exhaust period and the early part of the inlet they assist each other and give the valve a quick motion. On the contrary, during the compression and part of the explosion periods, both eccentrics counteract each other, so that the valve remains almost stationary. This kind of irregular motion is necessary on account of the difference in duration of the above said periods. It can be obtained either by using a combination piston and sleeve valve, as described in the writer's former paper, or by using this single valve and a double-eccentric operating mechanism. Of course, the double-eccentric motion is not limited to the piston valve only, but can be applied easily to the oscillating or sleeve valves, etc., also. In all cases the shape of valve opening curves will be quite favorable. The inlet curve will show a quick rise at the start and a more gradual closing. The exhaust will have the contrary—a gradual increase of valve velocity when closing.

Rotary Cylinder Motor

The very curious construction shown in Fig. 7 hardly appears to be practical, but it is being claimed for it that it not only works but works well. Even believing this, it would be interesting to see some figures as to the quantity of oil consumed. The cylinder A is provided with valve

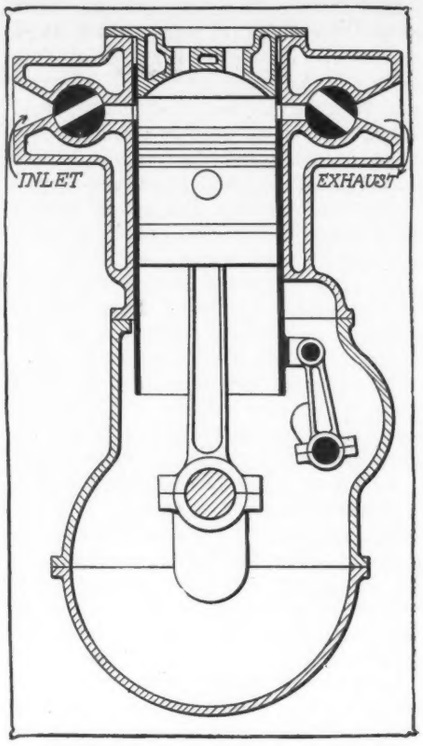


FIG. 5—COMBINED ROTARY AND SLEEVE VALVES

ports in its top part and revolves itself, whereby the ports or port register with inlet and exhaust passages located through the surrounding waterjacket. The cylinder rotates at one-quarter crankshaft speed, which is rendered possible by using double inlet and exhaust ports. Its drive is through a worm and wheel and can be

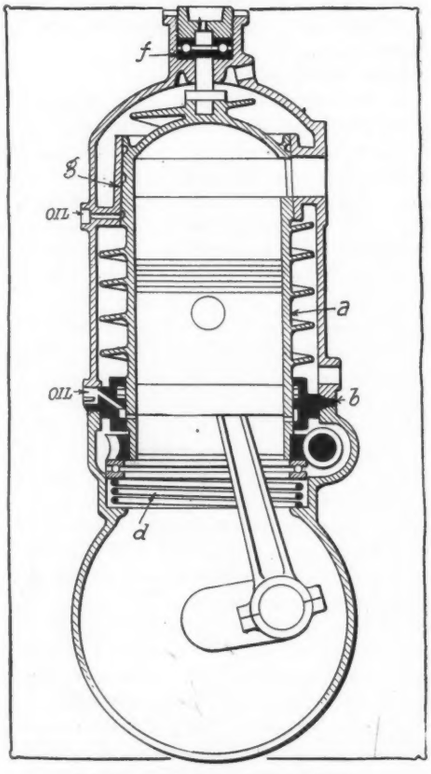


FIG. 7—ROTARY CYLINDER MOTOR

understood from the drawing. The top of the cylinder fits on a slight taper G into the adjoining part of the waterjacket housing. Oil under pressure of 6 pounds per square inch is led to this taper and also to the lower packing B, as shown. The cylinder A has spiral fins outside, which should assist the water circulation. The oil, being led to places as indicated, besides serving as lubricant, should also prevent the jacket water from penetrating into the crankcase through the packing B, and into the cylinder through the taper joint G. For the latter purposes the oil should be supplied in abundance, so that its flow overpowers the tendency of the water to penetrate into the joints, on their whole circumference. Thus it can be anticipated that a great part of the oil supply is wasted into the waterjacket, the rest of it being burned and carried away by the exhaust gases.

It is also being claimed for the construction of Fig. 7 that the taper joint G of the cylinder head is self-regulating, because the spring D has a tendency to push the whole cylinder upward. On the other hand, the ball-thrust bearing F in the top takes up this spring pressure and also the explosion pressure acting from the cylinder inside against its top. Such being the case, the wear in the joint g can be taken up only by hand-adjusting bearing F, because it is hard to presume that the wear in this bearing will equal that in the joint.

Oscillating and Sliding Sleeve Valve

Construction after Fig 8 represents a certain interest because it employs a combined sliding and oscillating motion for its sleeve valve. The construction, which is more or less clear from the drawing, is such that during the compression and expansion periods the inlet and exhaust valve ports are hidden in the water-cooled cylinder head, shielding them from high temperatures. The sleeve valve itself has almost no sliding motion during its upper position, but its rotating motion is the greatest then. Through the latter it is being shifted so as to bring its exhaust ports approximately in line over the exhaust openings of the cylinder as shown. The crank disk A operates the valve in this manner by means of a pin B, pivoted at the valve sleeve in C, and having a bearing D in the disk A. During the expansion period the sleeve valve starts downward, and in due time the exhaust ports of both sleeve and cylinder will register. At the lowest sleeve position again it will have the greatest rotative motion in the opposite direction, whereby the exhaust ports will be closed and the inlet will start to open. The inlet ports are closed by the continuing and increasing upward sleeve velocity, combined with slowing down of its rotation. The shape of the inlet valve opening curve will be irregular, viz., a quick straight line start, like that of a rotary valve, gradually acquiring the character more of a sinusoid curve.

Fig. 9 represents a French sleeve-valve construction, which has been actually built and tried, and is said to be successful. The valve A is split lengthwise in B, allowing it a slight spring to keep tight the cylinder inside. The inlet port I and the exhaust port E are located one above the other, at both sides of the place adjoining the split B. The valve is operated through a lever D with sliding blocks G on one end of it and a ball joint F on the other. The motion is transmitted from the crankshaft to a half-time shaft C, provided with a cam M, in which operates the bell crank U. This latter is also connected with a ball joint K to the lower end of the adjustable rod P, acting on the lever D.

The construction is very complicated, with many joints and other places subjected to wear. Though this wear can be taken up in some places, there are others bound to have lost motion. The valve openings can be made of a very favorable character by using the cam M of proper shape. However, the start and end of the opening have to be made more or less lingering; otherwise the sudden motion impulse will create great strains in the operating mechanism, which has a number of weak points.

Half-Sleeve Valves

Another French construction makes provision for using two separate sliding valves—one for the inlet, the other for the exhaust, whereby each of these valves represents a half of a cylindrical sleeve valve, similar to that of the Knight motor. These half-sleeve valves work directly between the piston and the cylinder. The motor has separate half-time shafts for operating the valves, like the ordinary T type of poppet valve motors. The construction has a defect found also in the last previous one described, viz., the inside pressure upon the valve is not equalized, and a considerable force is required to overcome the friction between the valve and the cylinder wall. The latter construction is still worse in this respect, because with a decrease of gas pressure during the expansion stroke the valve surface exposed to this pressure increases.

In conclusion, the writer wishes to repeat his opinion that those valve systems which should and which will compete successfully with the poppet valve ought to be the least complicated mechanically. The combining of different valve systems with the intention to create an advantageous construction fails even in its avowed purpose. Moreover, in most cases the separate use of valve types, entering the combination system, ought to be better than the latter. Some further development of the individual valve types has to be accomplished before employing of combination systems can be justified.

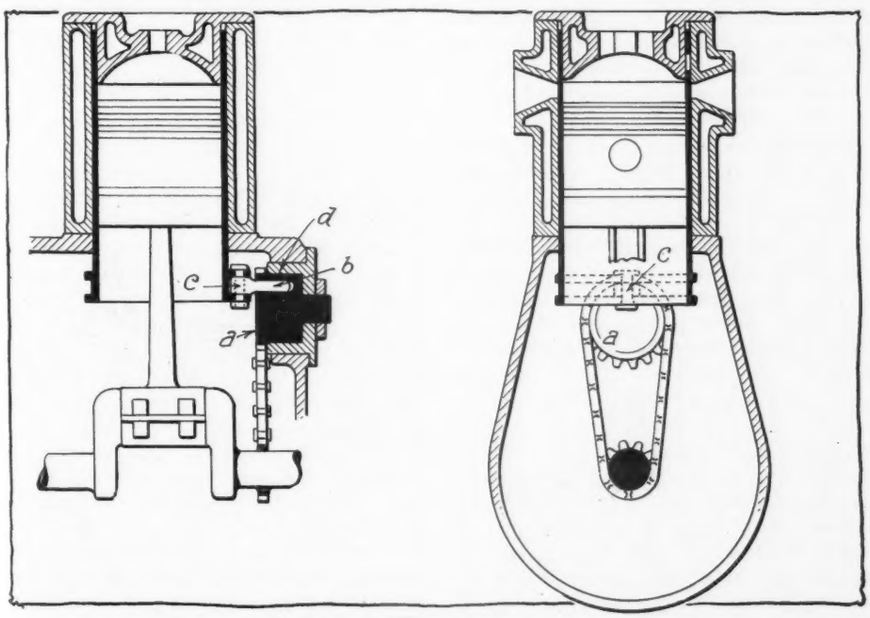


FIG. 8—COMBINED OSCILLATING AND SLIDING SLEEVE VALVE

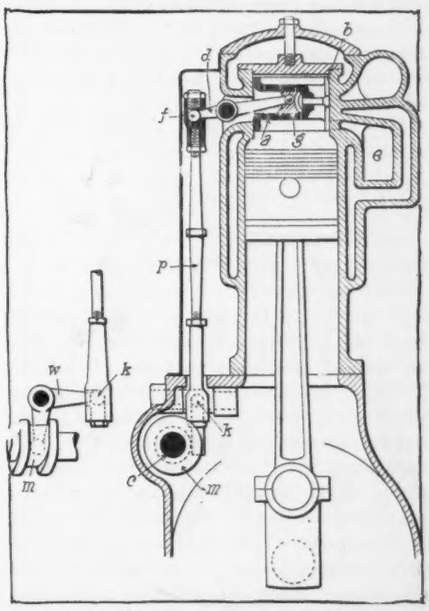


FIG. 9—FRENCH MOTOR SAID TO BE SUCCESSFUL

Bits of News From the Four Winds

C. H. Smith Converts His Ford Into Motor Sleigh

For Winter Use—W. A. Forsyth and R. J. Burr, of Standish, Mich., have taken the motor out of a model 10 Buick and have produced a practical motor sleigh.

Columbus Chairmen—The Columbus Automobile Club, of Columbus, O., has announced the standing committees for the year as follows: Good roads committee, Henry A. Mason, chairman; house and entertainment committee, C. Roy Clough, chairman; membership committee, Walter E. M. Ranchaous, chairman; legislative committee, Charles E. Firestone, chairman.

Wants Money for Roads—State Highway Commissioner T. A. Ely, of Michigan, will ask the legislature for an appropriation of $250,000 annually for the ensuing 2 years to conduct the highway department and provide for state rewards on good roads. The last appropriation was for $150,000 annually and the work of the department consumed the entire amount and the balance of $57,000 in the treasury when Commissioner Ely was appointed. About 300 miles of state reward road were built the last fiscal year and already applications are on file for 250 miles for the coming year.

Good News for Tourists—A scheme to convert the famous old Staunton and Parkersburg turnpike into a motor course, which will be one of the best in the state, was launched last week at Monterey, Va., and is exciting graifying interest. Dr. I. H. Trimble, of Staunton, started the enterprise. The plan upon which it is being carried forward is a subscription of $100 each from 100 men, who are interested in the work, to be used as a nucleus, and aid from the state and two counties will be solicited, and it is not thought that any difficulty will be met in securing their cooperation. When this splendid course has been completed, it not only will be of untold benefit to that section of the country because of a lack of railroad outlets, but it will intersect the New York to Atlanta course at Staunton, which will afford a splendid opportunity for tourists through the south to branch off from the main course into the picturesque mountain section of Virginia.

Show for Bloomington—Under the auspieces of the local agents, the first show in Bloomington, Ill., will be given at the Coliseum on February 20, 21 and 22. This hall is admirably adapted for the purpose, the floor space being extensive, while the stage is also available and, in addition, there are large side rooms for motor cycles, accessories, etc. Nearly all of the available space has been sold and the success of the show is assured. The central Illinois district is believed to be the richest agricultural center in the country, and has proven a profitable field for car agents. This fact has led to an unexpected demand for space and remarkable interest is being displayed in the coming exhibition.

Against the Governor—Road Commissioner Ely and Deputy Commissioner Rogers both strenuously oppose Governor Osborn in his message to the Michigan legislature, although they are with him in favoring the recommendation for the use of convict labor in constructing roads. The points at issue are the governor's favoring state supervision of roads and the construction of the county trunk lines touching each of the county seats. Both of the highway officials declare that the county road system should continue for several decades, and also state that it is far better to construct roads leading to the important market places of the different counties of the state than it is to have them lead to the county seats. Commissioner Ely believes that the highway department easily has proved the greatest road-building factor in Michigan history. Already the state has paid rewards for more than 800 miles of road and last year it rewarded on more than 280 miles.

Testimonial for Speare—When the Bay State A. A. has its annual banquet in Boston on February 8 the testimonial that the A. A. A. officers are to give to ex-President Lewis R. Speare will be presented to him by President Robert B. Hooper, of Philadelphia, his successor. The gift will be in recognition of Mr. Speare's activity in promoting the affairs of the A. A. A. during his regime of two years. Governor Eugene Noble Foss, of Massachusetts, and Mayor John F. Fitzgerald, of Boston, will be specially invited guests. It is expected that at least 400 motorists will be present.

Worcester Club Growing—An informal opening of the Worcester Automobile Club's old quarters, which were burned out some time ago, at Worcester, Mass., and which have been rebuilt and remodeled throughout as well as several rooms added, will in all probability be held on February 1, according to the plans of the board of governors. Since the club quarters was destroyed by fire almost 100 members have been added to its membership list by the taking over of the members of the old Hancock Club, and it is understood that the surplus in the club's treasury is now the largest in its history.

Get Another Bay State Man—Frank H. Joyner, who has been a division engineer for the Massachusetts highway commission for a number of years, has just accepted a position as engineer in charge of maintenance and repairs of the highways of Los Angeles county, Cal. This is the second Bay State man connected with the highway commission that has been secured by California, Secretary A. B. Fletcher having gone there about a year ago to accept a responsible position in charge of highway construction work. When the county highways are completed the county will have an investment of $3,500,000 in roads. Much of the highway work in western Massachusetts was completed and maintained under Mr. Joyner's supervision.

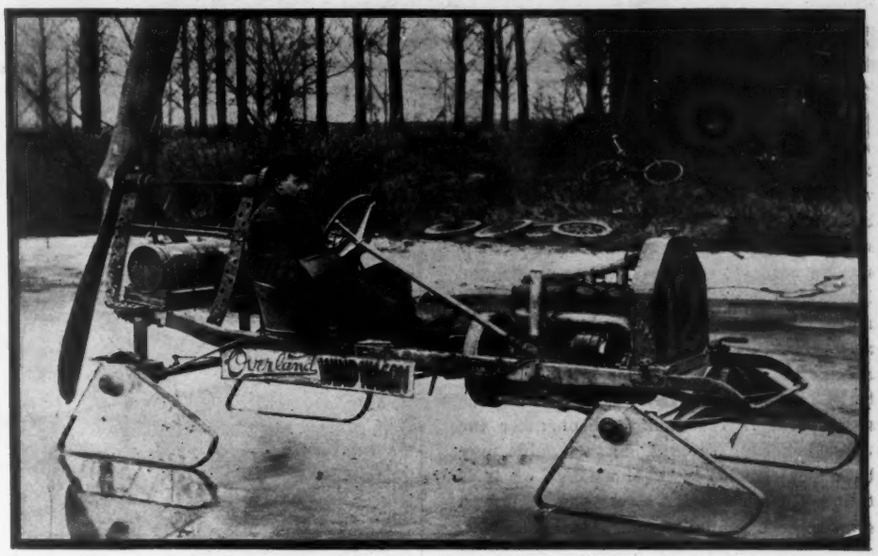
Good News for Delaware—Delaware will have an improved state road, 100 miles in length, from the Pennsylvania boundary on the north, at Claymont, to the Maryland boundary on the south, at Delmar, running almost in a straight line and, after leaving Wilmington, 7 miles below the northern end, almost level, if interests now determinedly at work on the project can prevail upon the state legislature, now in session, to adopt the plan they propose, which is to bond the state for the required amount, the interest to be paid out of the motor license receipts and the bonds to be redeemed in the same manner, as they fall due. Should the proposition succeed it will mean a great deal, not only to owners and drivers of motor cars and other vehicles in Delaware, but also to those from other states, as Delaware is in line with the direct route between the northern and

southern Atlantic coast cities. The road will be on a direct line from Wilmington to Cape Charles, Va., the distance between the two places being about 200 miles, and as Cape Charles is the terminus of the water line in the rail route between New York and Norfolk, Va., there will be an added attraction for that reason.

Turns Car Into Sleigh—That sleighing, the one stamping ground on which to the present time the motor car has not superseded the noble equine, will not in the future be monopolized by the horse, is the prediction of C. H. Smith, inventor, Rockford, Ill., who has turned his Ford into a sleigh by means of runner attachments. The tires of the front wheels are removed and runners of channel iron made. These are fastened on by a bolt through the valve hole of the rim. The wheel is wedged both front and rear to keep it from revolving and a ⅜-inch rod run from the front end of the runner over the rim and fastened to the rear end of the runner with a nut. The rear wheels should be chained. The inventor states that steering is not difficult, and that but one-third the usual amount of power is necessary to propel the new hybrid vehicle.

Ohio Suggestion—A permanent state highway commission of three members to have charge of Ohio state road improvements was proposed by Hugh K. Lindsay, county surveyor of Franklin county, at the convention of the County Commissioners' Association at Dayton recently. Mr. Lindsay called attention to the smallness of the state's appropriations, which amounted to only $10,000 5 years ago and $150,000 in 1906-07. Now, it is $5,000 for each county in the state. Surveyor Lindsay said that it should be the duty of the three commissioners to secure all information possible from each county in regard to the conditions of the roads throughout the state, and statistics showing the amount and kind of traffic on every road to be improved, that it may be done intelligently. They could then designate the names and number of the main market roads and those which could be known as state roads and could select the proper roads to be improved at once. This order should prevail for all time to come.

New Winter Sport in Motor Cars

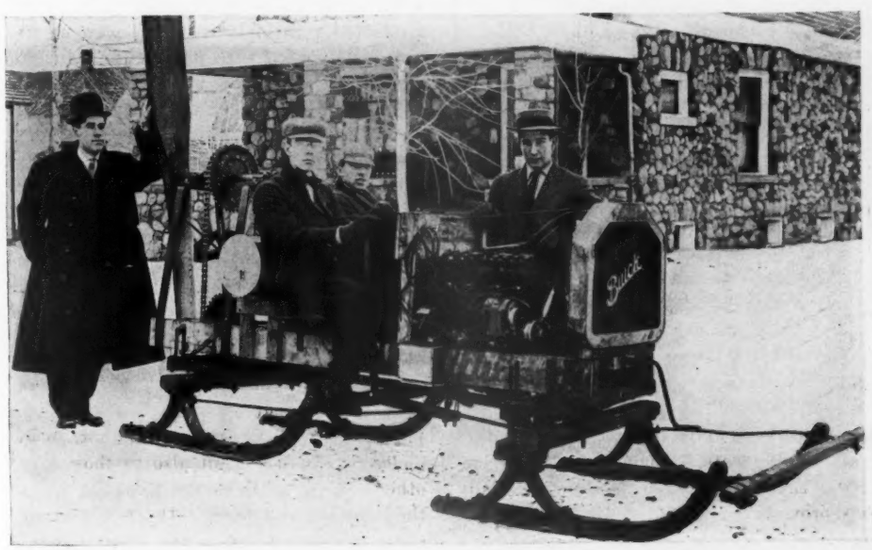


OVERLAND WIND-WAGON PUTS ON SKATES

Wind Wagons Now Skates—Surprises come often when the Overland wind wagon performs. It has now been equipped with runners and has been driven at high speed over the snow-covered roads and the ice of the river and creeks around Indianapolis. The wind wagon was first introduced to the public at the Indianapolis motor speedway last summer, when it raced against Walter Brookins in his Wright aeroplane. It is a stock Overland car driven entirely by the wind resistance created by the revolving propeller in the rear. The differential is not connected with the drive shaft. In fact, there is no drive shaft, as a chain combination connects the motor and the 8-foot wooden aeroplane propeller in the rear. There is only a 6-inch clearance between the wooden propeller and the ice, and for this reason, and also because it frightens horses, it can not be used much on the roads. The testers at the Overland factory have great winter sport skating with the wind wagon on the river when the ice is thick enough.

Police Motor Car Records—A report has been filed with Mayor Shank of Indianapolis of the number of miles traveled by the police motor cars of the city during 1910. The National emergency car made 1,163 runs, traveling 7,291 miles and carrying 442 prisoners. The two Rapid patrol wagons combined made 6,501 runs after prisoners and also made numerous trips with prisoners to the workhouse and female reformatory. These two wagons traveled 20,647 1-10 miles and hauled 8,283 prisoners to the police station.

Means Universal Lights—Scores of collisions between vehicles which are not required by law to carry lights and motor cars have caused the Michigan State Automobile Association to prepare the following amendment to the state motor vehicle law, which will be introduced for passage at the present session of the legislature by Representative A. Ward Copley, of Detroit: "Every vehicle used upon the highways of this state, which said word 'vehicle' shall include horse-drawn vehicles, or vehicles drawn by other beasts, carriages and all other means of conveyance, except motor cars and motor cycles, and such as run only upon rails or tracks, shall carry during the period from 1 hour after sunset to 1 hour before sunrise, at least one lighted lamp, showing a light visible at least 250 feet. Said light shall be so displayed that it may be seen in either direction toward which or from which the vehicle is proceeding."



RUNNERS ON BUICK MAKE MOTOR SLEIGH

The Motor Car Repair Shop

IT sometimes happens that when a long, stout lever is employed in loosening the valve-spring seats from the stems a severe strain is put upon a stem and it is bent. The same is litble to occur when the springs are again being attached to the steams after the valves have been ground in. When a valve stem is bent in its removal it is most liable to be discovered, though the repairman is quite likely to assume that the cause of its binding slightly in the guide, is due to carbon on the stem. But if the stem is bent after the valve has been ground, much trouble may be experienced before the cause of it is found. When a valve stem is bent, it will stick in the guide at times and an intermittent misfiring will result. The symptoms being most characteristic of ignition or carbureter trouble, are very misleading and it would be a very good plan for the motorist and repairmen to make a note of troubles of this nature and file them away for future reference. Broken or weak valve springs give rise to similar indications, and might be in this same category.

Compressed Air in Repair Shops

In few instances, if any, is compressed air more generally useful than in the motor car repair shop. It uses are so numerous and varied that hardly an up-to-date shop is without it. In James E. Plew's new White garage in Chicago, recently completed, an excellent compressed air equipment is to be found; and it is employed in cleaning steam generators, in testing radiators, joints and for sand-holes in castings. Steam engines are tested out with it by using it in the same way that steam would be used; it is required in spraying kerosene on engine parts for cleaning purposes; it creates the blast for the forge and brazing outfit; it is useful in blowing chips and filings out of holes, corners and crevices of mechanisms while working upon them; and the outfit pays for itself over and over again by simply eliminating the hand-pump inflation of tires.

A single-cylinder air-compressor, belt-driven from the electric motor that runs the rest of the machine tools, furnishes the compressed air, which is conveniently piped to all work benches and to all parts of the building requiring it.

To clean the tubes of a steam boiler, they are heated to a dull red to carbonize any oil or grease therein, then allowed to cool and the carbonized particles blown out by means of the compressed air. Radiators are tested by plugging the outlets and applying compressed air to the radiator while submerged in water; the leaks, if there be any, being indicated by the bubbles that arise.

Hints for the Amateur

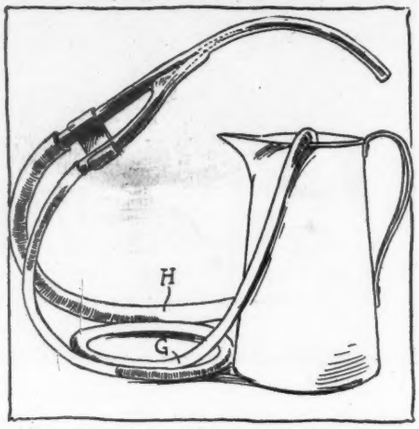


FIG. 1—SPRAYING OUTFIT FOR CLEANING

Joints and castings are tested in a similar manner, by providing means of plugging the openings and applying compressed air, then placing the parts to be tested under water. Steam engines can be run by compressed air just as readily as with steam, and after a steam engine has been repaired or overhauled, the compressed air can be turned into the steam pipe and the motor run as long or fast as is necessary to indicate any inefficiencies in the way of mis-alignment or ill-fitting bearings. For cleaning dirty, oily, or greasy parts with a spray of kerosene or gasoline, compressed air and a blow-pipe of simple construction are incomparable.

A home-made blow-pipe such as is used for such purposes in another Chicago shop is illustrated in Fig. 1, the hose H being adapted for attachment to the compressed air piping, and the end of hose G being submerged in the cleaning fluid used in the spraying operation. After scraping in a set of bearings, or during the operation, chips of metal generally lodge in oil pockets and crevices, which, without facilities for proper cleaning, often are left in after the motor has been assembled; with the result, that not only is the lubrication sometimes impaired, and followed by disastrous results, but the bearing surfaces of the crankshaft, connecting rods, etc., have in a number of cases been badly scored.

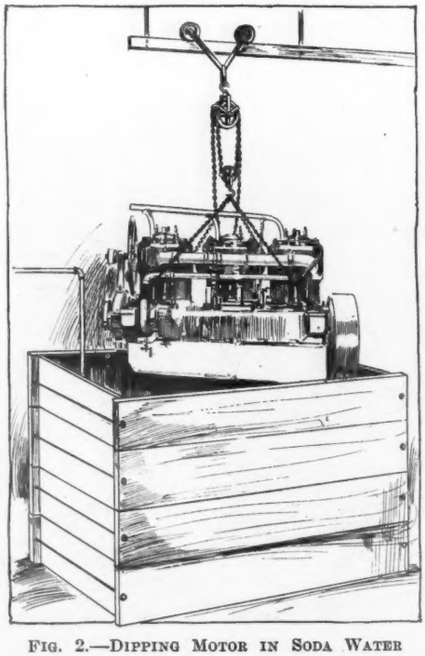


FIG. 2.—DIPPING MOTOR IN SODA WATER

Washing Soda for Cleaning Motors

A solution of common washing soda and hot water is one of the best cleansing fluids for oily, greasy or dirty mechanisms that exists, and in addition to its cleansing efficiency it is most economical, it being far more economical and even more effective, in a way, than kerosene or gasoline. There is one disadvantage to its use in the shop, however, and that is, that it attacks aluminum. This should be borne in mind by all who use it, and where soda-water cleansing tanks are employed a sign of warning to this effect should be attractively posted, otherwise some new or unsophisticated repairman or helper may allow a gearcase or crankcase to soak in the solution, with harmful results to said case.

Even aluminum parts may be dipped in a hot soda solution, though, if it is immediately removed and rinsed in pure warm water; and it is claimed by many that no harm is done to aluminum parts if simply dipped or rinsed in the hot soda solution and the rinsing in pure water neglected. Still, it is well to be on the safe side, and if such parts are afterwards dipped in pure hot water they are not only well cleaned, but they dry off readily.

In the White garage, Chicago, a large wooden tank such as is illustrated in Fig. 2 is employed for cleaning steam engines and other motor car mechanisms. It is filled with a solution of common washing soda, which is kept hot by a jet of steam that flows into it continually. The steam is taken from the garage heating system, and is conducted to the tank through the pipe shown. An overhead rail for a traveling block-and-tackle outfit extends over the tank or trough, and when a car is overhauled the motor is lifted right out of the chassis, conveyed to the tank, lowered and moved about a bit in the hot soda water, then raised, and sprayed with a kerosene spray to remove whatever dirt or grease still clings to the engine.

Current Motor Car Patents

MOTOR Priming Device—No. 981,337, dated January 10; to Axel M. Walstrom, Minneapolis, Minn.—This patent relates to a means for facilitating the starting of hydrocarbon engines such as are now used in almost all gasoline motor cars. The devices comprise, as shown in Fig. 1, a compression relief device communicating between the inlet pipe of the motor and each of the cylinders and having a valve V near its attachment to the inlet pipe which may be operated by means of a rod R arranged to pass through the dash-board or the radiator as desired.

A tube T communicates between the float-chamber F of the carbureter and the valve V. In operation, when the valve V is opened, and the motor cranked, the compression in each cylinder is released and passes through the piping P and the valve V into the inlet pipe of the motor; and as this column of air passes the specially arranged opening of the tube T, a partial vacuum is created therein, and fuel is drawn from the float-chamber of the carbureter, mixed with the air, and sprayed into the inlet pipe of the engine. Thus a combustible mixture is formed and starting facilitated. The device works on the same principle as the ordinary atomizer such as is used for spraying perfume, or of the blow-torch used in soldering or brazing.

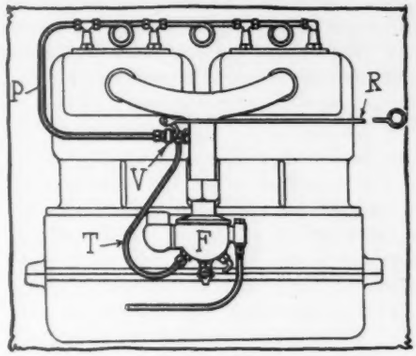


FIG. 1—WALSTROM PRIMING DEVICE

Muffler Design—No. 981,584, dated January 10; to James Madison Miller, Washington, D. C.—The muffler or silencer to which this patent relates is illustrated in Fig. 2, and its important feature is a series of baffle plates or deflecting members M arranged in alignment and forming a central passage through the muffler, which is surrounded by an annular collecting space S between the outer edges of the deflecting members and the casing C. The final deflector D corresponds to the remaining deflectors, except that it is perforated and has a perforated wall bridging the central passage.

Each deflector is of concavo-convex design, with its circular inner edge extending forward, the central opening of each succeeding deflector is smaller than the one in front of it, the inner edges extend farther forward as the central opening of each deflector decreases in diameter; and a series of slotted openings are arranged in the outer edges of each deflector which communicate with the collecting space S.

It is intended that each deflector will collect a portion of the exhaust gases as they enter the muffler at E and move through the central passage; and the arrangement and construction of the plates should be such that the silent expansion and elimination of the gases is obtainable without back pressure in the exhaust pipe of the motor.

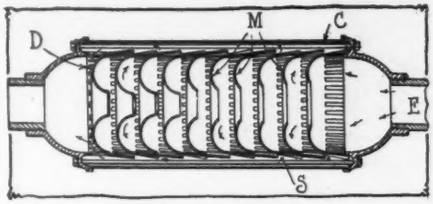


FIG. 2—MILLER'S MUFFLER DESIGN

Clutch Type Differential Mechanism—No. 981,259, dated January 10; to George H. Graham, Chicago, Ill.—This invention not only permits of differential movement of the driving wheels of a rear-axle such as is now used in motor cars, but it eliminates that disadvantage of leaving both wheels powerless to propel the car in case one wheel loses traction, which is characteristic of most differential mechanisms now in use.

As illustrated in Fig. 3, a clutch drum D, is fixed to one end of each of the transverse driving shafts S of the rear axle; a clutch shoe O having adjacent free ends is arranged within each drum, a means is provided of expanding the shoes and making them grip the drums attached to the driving shafts, when rotary power is applied to the casing C to which the bevel driving gear G is secured. The clutch-shoe operating mechanism is automatic in its action and comprises pinion-sectors fixed to the stub shafts T, inwardly extending teeth formed on the casing C with which the teeth of the pinion-sectors mesh, and double-acting cams K on the shafts T, position between the adjacent ends of the clutch-shoes to expand and release them.

With this differential construction, the driving power is always transmitted to the slower moving wheel; or, in other words, driving power is transmitted to both wheels, but one wheel may run faster than the other if necessary. Thus, in making turns, the inner wheel would propel the car and the outer wheel would be allowed to roll around at a faster rate of speed. This design of differential should also reduce skidding tendencies on rounding curves, because better tractio n can be maintained.

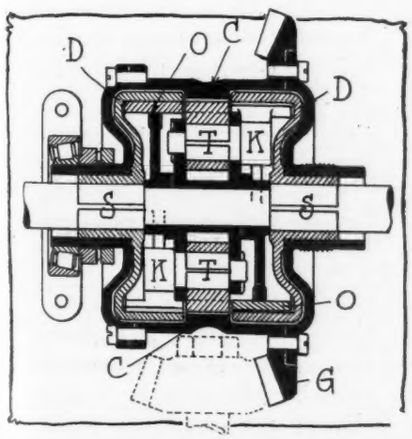


FIG. 3—THE GRAHAM DIFFERENTIAL

Motor Car Speed Regulator—No. 981,080, dated January 10; to Anthony B. Griep, Aurora, Mo.—As the name implies, this patent covers a means of regulating the speed of motor cars, and the regulation of the speed is obtained by arranging an ordinary centrifugal governor in the flexible shaft of the speedometer, so that when the speed exceeds a predetermined limit, either the ignition will be automatically cut out, or the flow of gasoline cut down, or both.

The device and its arrangement is indicated in Fig. 4. It consists of a frame F, the governor mechanism within the frame and operated by the flexible shaft T, and a tubular member connected to the governor mechanism, which is slidable and rotatable and provided with an adjustable collar C at its lower end adapted to make and break the electrical connections E, and regulate the flow of gasoline through the pipe P through suitable connection to the valve V.

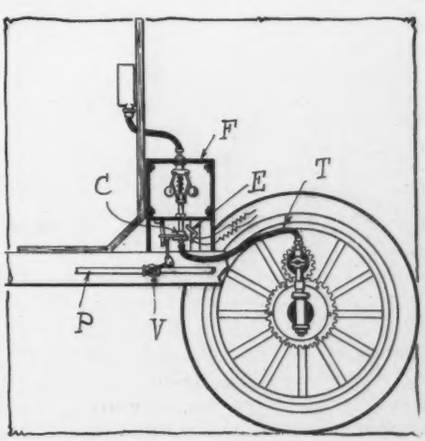


FIG. 4—GRIEP'S SPEED REGULATOR

Among the Makers

ZIMMERMAN'S New Sales Manager—E. C. Altenberg has been appointed sales and advertising manager of the Zimmerman Mfg. Co., Auburn, Ind.

New Carbureter Plant—A new company for the manufacture of carbureters has been formed in Cleveland. It will be known as the Bingham Mfg. Co. and will locate at 227 Prospect avenue. W. H. Bingham, who is the president, invented the carbureter which he will manufacture. A line of accessories also will be kept by this firm.

Buys Milford Plant—The Royal Rubber Co., of Akron, O., which held its annual meeting last week, purchased the Milford Rubber Co., of Milford, Ill., and will add the equipment to its plant in Akron. Officers were elected as follows: President, W. M. Blecker; vice-president, F. A. Wilcox; treasurer, J. E. Whigham; secretary, J. A. H. Myers; general manager, J. C. Gibson. These five constitute the directors also. The company recently issued a 50 per cent stock bonus and now has a capital stock of $200,000. It has begun the manufacture of solid and pneumatic tires.

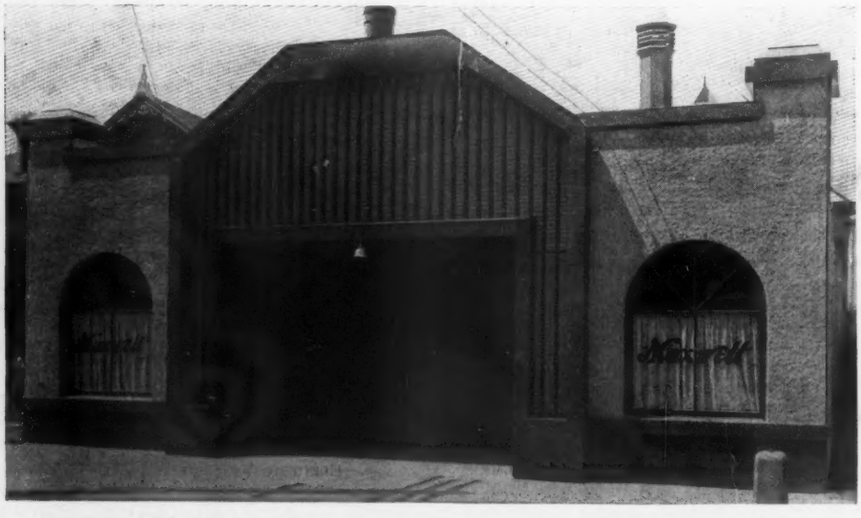
Who Buys Motor Cars?—What kind of people are buying motor cars and how do they, as individuals, stand in their respective communities? Charles T. Jeffery, head of the Thomas B. Jeffery Co., has answered this question—at least, as far as Rambler sales are concerned—by taking a sales census among Rambler dealers for a limited period during 1910. Four hundred sales made during this period were reported as soon as consummated, and as they came from widely separated sections of the country they may be said to have been taken at random from those 2,500 sales which were made to Rambler buyers in 1910. Practically every section of the union is represented. The list of those representing different occupations who purchased the Rambler during that limited period includes: Bankers, 43; doctors, 24; merchants, 97; real estate dealers, 30; lawyers, 8; farmers, 76; architects, 3; manufacturers, 26; contractors, 11; engineers, 4; retired capitalists and miscellaneous, 88. Among the merchants there are men in many business pursuits, and those classed under farmers include also ranchmen and fruit growers.

Goodrich's Annual Meeting—At the annual meeting of the B. F. Goodrich Co. the stockholders heard an encouraging report of the past year, when the volume transacted exceeded any previous year. No announcement of additional buildings next year was made, but the company will make whatever extensions are necessary, as it did the past year, when several large additions were built. The directorate and officers for the coming year remain unchanged. B. G. Work was elected president by the directors; F. H. Mason, first vice-president; H. E. Raymond, second vice-president; C. B. Raymond, secretary and assistant treasurer; W. A. Means, treasurer; E. C. Shaw, general manager of works. The stockholders reëlected the following directors: B. G. Work, George W. Crouse, F. H. Mason, E. C. Shaw, H. E. Raymond, C. B. Raymond and C. C. Goodrich.

Crawford With Cole—Charles S. Crawford, a former resident of Indianapolis and factory manager of the Westcott Motor Car Co., of Richmond, Ind., has resigned to take the same position with the Cole Motor Car Co., of Indianapolis.

Changes Name and Location—The Agnew Electric Welding Co., of Detroit, has changed its name to the Michigan Electric Welding Co., and also its location, the plant now being at the corner of Third and Congress streets. The new quarters consist of a one-story brick building on this corner, which is 35 by 60 feet, and in

EXTERIOR OF STODDARD-DAYTON AGENCY AT LOS ANGELES, CALIFORNIA



WHERE THE MAXWELL CAR IS HANDLED IN SAN JOSE, CALIFORNIA

The Show Circuit

January 14-28—Show of Philadelphia Automobile Dealers' Association, Philadelphia, Pa.
January 28-February 2—Pleasure car show in Chicago.
February 1-4—Show at Worcester, Mass.
February 5-10—Show of National Exhibit and Auction Co., Pittsburgh, Pa.
February 5-11—Show at Buffalo, N. Y.
February 6-11—Second week of national show in Coliseum, Chicago.
February 9-12—Show at Davenport, Ia.
February 13-18—Show at Winnipeg, Canada.
February 13-18—Show of Kansas City Motor Car Trade Association.
February 13-18—Show at St. Louis, Mo.
February 13-18—Show in Convention hall, Washington, D. C.
February 15-18—Show at Grand Rapids, Mich.
February 14-19—Show at Dayton, O.
February 18-25—Show at Minneapolis, Minn.
February 18-25—Show at Binghamton, N. Y.
February 18-25—Show at Brooklyn, N. Y.
February 18-25—Show at Newark, N. J.
February 20-21—Show at Portland, Me.

and Dealers

the rear a two-story building approximately 25 by 65 feet. In addition to this there is a large store room. The company has added machinery. A specialty is being made of motor car work, and rod and yoke end assemblies are furnished complete.

Petrel Company Moves—A new era is marked in the affairs of the Petrel Motor Car Co., of Milwaukee, Wis., manufacturer of the Petrel friction-drive cars, by the removal of the plant to its new buildings at the southern border of Milwaukee. The capacity of the new plant will be twenty-five cars a day. The company is now owned by the Filer & Stowell Co., one of the largest builders of sawmill machinery and engines in the United States, which concern also owns the Beaver Mfg. Co., maker of the Beaver gasoline motor for cars and trucks. A racing and reliability campaign has been started, and Harry Nelson will head the team.

Schacht in New Factory—The Schacht Motor Car Co., of Cincinnati, has made a change from the old to the new. It is now comfortably installed in its new plant and is turning out four-cylinder cars at the rate of ten a day. The present factory is three times as large as the old plant, with acreage for increasing to four times the present capacity.

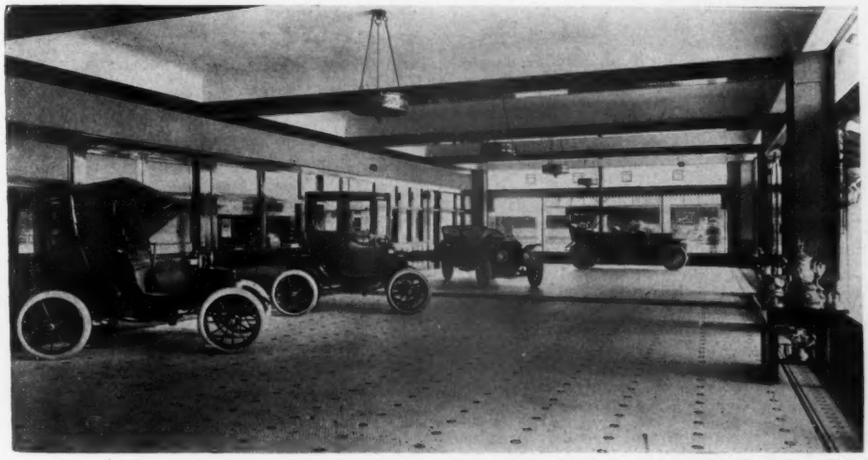
South Dakotans Organized—A meeting of a number of the dealers of South Dakota was held in Sioux Falls recently, and an organization was formed which will be known as the South Dakota Automobile Dealers' Association. The following officers were elected: President, C. R. Neby; vice-president, Knapp Brown; secretary, F. S. Smith; treasurer, D. R. Chapman. Following the organization of this association, the matter of holding the first annual motor show in Sioux Falls was discussed. It was decided to hold one some time during the coming summer.

Thomas Branch Opens—The formal opening of the Boston branch of the E. R. Thomas Company in its new home built for it on Boylston street, took place Wednesday and there were hundreds of people present during the day inspecting the cars and the building.

Establishes Steel Agencies—Edgar Allen & Co., Ltd., Imperial Steel Works, Sheffield, England, whose chief American office and warehouse is at 434 West Randolph street, Chicago, announce that agency arrangements have been completed with the following firms, at whose warehouses stocks of Allen's high-speed and carbon-tool steels will be carried: Roehm & Davison, Detroit, Mich.; J. L. Osgood, Erie County Bank building, Buffalo, N. Y., and John J. Greer & Co., 207 West Pratt street, Baltimore, Md.

Will Move to La Crosse—The Reliance Iron and Engine Co., of Racine, Wis., builder of engines and motors, has decided to accept the proposition of the Business Men's Association of La Crosse, Wis., to remove to that city. The company was established several years ago with a capital stock of $35,000 and now employs 100 skilled workmen. The capital will be increased to $100,000 to cover the erection of a new plant at La Crosse, and business men of that city will become investors in the enterprise.

Boston Firm in Trouble—The Waite-Robbins Co., Boston agent for the Babcock electric and the Atterbury truck, has gone under after about a year of life in the Hub. The company when first organized comprised Fred Robbins, of Chicago, and Charles Waite, of Cleveland. Mr. Waite later withdrew. Mr. Robbins was under heavy expense and he made a hard fight, but it proved too much. The salesrooms on Boylston street have been vacated and bankruptcy proceedings are now in progress.



INTERIOR VIEW OF STODDARD-DAYTON AGENCY AT LOS ANGELES, CALIFORNIA

For This Winter

February 20-22—Show at Bloomington, Ill.
February 20-25—Show of Hartford Automobile Dealers' Association, Hartford, Conn.
February 20-25—Show at Omaha, Neb.
February 20-25—Show at Cincinnati, O.
February 20-25—Show at Baltimore, Md.
February 24-27—Show at New Orleans, La.
February 25-March 4—Show at Toronto, Canada.
February 27-March 4—Show of Kansas City Automobile Dealers' Association, Kansas City, Mo.
February 27-March 4—Show week at Indianapolis, Ind.
February 27-March 4—Show at Sioux City, Iowa.
March 4-11—Show at Boston, Mass.
March 6-11—Show at Des Moines, Ia.
March 7-11—Show at Des Moines, Ia.
March 13-18—Show at Cedar Rapids, Ia.
March 14-18—Show at Syracuse, N. Y.
March 13-18—Show of Cleveland Automobile Dealers' and Makers' Association, Cleveland, O.
March 14-18—Show in Auditorium, Denver, Colo.
March 18-25—Show in Pittsburg, Pa.

HEADQUARTERS OF STEARNS, CHALMERS AND R. & L. ELECTRIC AT LOUISVILLE, KY.

Recent Business Announcements

Activity of the Makers and Dealers. Agencies Placed and Other Changes in the Trade. Pithy Bits of News From Everywhere Concerning the Industry

MADISON, WIS.—The Schoelkopf Garage is being enlarged and remodeled.

Austin, Texas—The Overland Garage Co., of Victoria, has changed its name to Texas Motor Car and Supply Co.

Baltimore, Md.—The agency for the Atterbury truck in Baltimore has been taken by F. W. Sandruck, Howard street, near Park avenue.

St. Louis, Mo.—The Auto Tire and Maintenance Co., of which W. E. Chapman is the principal stockholder, has been incorporated to manufacture and deal in supplies.

Superior, Wis.—The Superior Auto Co. organized a month ago, has started work on a garage to be 50 by 100 feet in dimensions and two stories high. Agency lines are being considered.

Everett, Wash.—The Auto Sales and Repair Co. has purchased the garage business of A. Mackey and will enlarge the place, install more machinery and carry a line of supplies.

Edmonton, Canada—The Scott Motor Ltd., of this city, has taken possession of its new quarters on the corner of Jasper avenue and Fourth street. The company handles the Russell, Mitchell and E-M-F lines.

Pittsburg, Pa.—J. M. Quinby & Co., have opened a branch in this city for the sale of their bodies and Simplex cars. A salesroom has been leased on the Grant boulevard with T. B. Pepperday of the Newark factory in charge.

Detroit, Mich.—The Sewell Cushion Wheel Co., whose factory is at 777 Gratiot avenue, is turning out a new cushion wheel. Officers of the company are Daniel Brill, John A. Hemmes, Ralph S. Moore, Herbert J. Sewell, John G. Dancy and Lewis E. Powell.

Ocala, Fla.—Ocala is to have a new company to be known as the Ocala Transfer Co., and to be capitalized at $10,000, the object of which is to own and operate a line of gasoline trucks between Ocala and Silver Springs for the transportation of goods, wares and merchandise.

Baltimore, Md.—A garage will be built by the Eigenbrot brewery and one of the most modern motor car systems for insuring quick delivery of beer will be installed by the company. The garage will be one-story high, of corrugated steel, with concrete foundation and slag roof. The garage will be erected on the west side of Wilkens avenue, south of Lombard street. It will be 40 feet in width and 45 feet in depth.

Cleveland, O.—The Garford Motor Truck Co. has opened a service department and salesrooms at the Buckeye garage.

Paris, Ill.—K. R. O'Hair will open a garage at Paris about February 1. He has the agency for the Hudson and will carry a line of supplies.

San Francisco, Cal.—Cuyler Lee, vice-president of the Automobile Dealers' Association and distributor of Packard cars has taken the agency of the Waverley electric for this territory.

Fond du Lac, Wis.—E. C. Franklin, representing S. F. Bowser & Co., makers of gasoline and oil tanks, has decided to locate a distributing agency for twenty counties in Wisconsin at Fond du Lac.

Pittsburg, Pa.—The A. J. Becker Co. has opened its factory at 5472-5474 Penn avenue, east end, where it will build bodies and cape tops and do general repairing and painting. A. J. Becker will be manager.

Dallas, Tex.—The Times Square Automobile Co. has opened a new branch at Dallas for the sale of new and used cars. Walter D. Tuff is local manager for the concern. The branch is at 1315-1317 Commerce street.

Boston, Mass.—J. W. Maguire expects to announce in a few days that he has signed papers for a garage, and possibly a salesroom for the Pierce-Arrow cars in Boston or vicinity. He has outgrown his old garage quarters and is somewhat cramped for room now.

Boston, Mass.—The Boston branch of the E. R. Thomas Motor Co. has moved into its new home on upper Boylston street, right in the heart of motor row. There will be a formal opening later when Manager C. S. Henshaw recovers from his present illness. The old salesrooms in Copley square were quickly taken, Manager J. S. Binney, of the Detroit electric, securing them. He will use the other structure on Columbus avenue for a charging station and garage.

Columbus, O.—The Automobile Tire Interlining Co. has been incorporated with an authorized capital of $25,000 by Mark D. Bruner and others to repair tires.

Pittsburg, Pa.—The Overland Pittsburg Sales Co. has taken the quarters formerly occupied by the Arlington Motor Car Co., Center avenue, east end. J. E. Graham will be manager.

St. Louis, Mo.—Giraldin & Stevens have opened a new accessory store at 4137 Olive street. The members of the firm are W. A. Giraldin, Jr., and Dillon Stevens. The store has the agency for the Roberts motor.

Omaha, Neb.—The Fisk Rubber Co. has opened a branch in Omaha. The company occupies a new sales room at 2210 Farman street. John H. Lionberger, formerly of the Kimball Auto Co. of this city, is manager of the company.

Waukesha, Wis.—Articles of incorporation have been filed by the Nyberg-Waukesha Auto Co., of Waukesha, Wis. The capital stock is $5,000, and Ward S. Bunker, Robert S. Coffin and W. R. Calkins appear as incoporators.

Omaha, Neb.—J. George Young, formerly a real estate man, has recently become manager of the Midwest Automobile Co., which handles the Cole and Westcott cars. Fay Knott and R. A. DeWitt, the former managers of the company, have retired from the business.

St. Louis, Mo.—The Whitman Motor Co. has opened salesrooms at 4144 Olive street, with H. L. Whitman, Jr., as manager. The concern formerly had quarters with the Whitman Agricultural Co. The Whitman Motor Co. handles the Grabowsky truck and also will represent the Mercer.

Boston, Mass.—The maintenance department of the New England branch of the Velie Motor Vehicle Co. was formally opened by Manager Morton H. Luce last week in the Shoe and Leather Exposition building, on the Charles River boulevard, Cambridge. Peter Cole, formerly of Grand

Incorporations of Various Concerns Identified with the

New York—Hentschel-Kemter Tire Co., capital stock $100,000; to manufacture tires; incorporators P. M. Kemter, A. W. Kentschel and C. I. Gillespie.

Boston, Mass.—Castle Square Garage, Inc., capital stock $20,000; incorporators A. E. Lozaro, Sr., A. E. Lozaro, Jr., and E. L. Lozaro.

Wilmington, Del.—National Motor Delivery Co., capital stock $50,000; to manufacture and deal in motor cars; incorporators F. H. Hoffecker, T. J. Bowden, Jr., A. McGarvey.

Louisville, Ky.—Auto and Taxicab Co., capital stock $50,000; to engage in a general passenger traffic business; incorporators C. J. Cannon, W. F. Glenn and L. W. Place.

Cincinnati, Ohio—Automobile Tire Interlining Co., capital stock $25,000; incorporators M. D. Bruner, C. L. Benz, G. A. MacDuff, W. Stacey and M. J. Roche.

Providence, R. I.—Revere Rubber Co., capital stock $400,000.

Boston, Mass.—Hill-Michie Co., capital stock $10,000; incorporators O. L. Hill, A. C. Michie, and C. H. Tebbetts.

New York—Stern Motor Co., capital stock $100,000.

New York—Windshield Mfg. Co., capital stock $200,000.

Buffalo, N. Y.—Nichols & Wright Motor Co., capital stock $300,000.

Buffalo, N. Y.—Hormel Auto-Appliance Co., capital stock $1,000,000.

Northport, L. I.—C. M. Bonner Co., capital stock; incorporators C. M. Bonner, H. A. Bonner, H. A. Thornburgh.

Red Bank, N. J.—W. H. Merritt Co., capital stock $50,000; to deal in motor cars; incorporators W. H. Merritt, B. E. Merritt, and C. A. Morris.

Atlantic City, N. J.—Bergdoll Taxicab Co., capital stock $125,000; to operate taxicabs; incorporators I. M. Garfinkel, Moses Garfinkel and I. Geisenberger.

Concerning the Motor Industry

Rapids, Mich., is superintendent of the department.

Pitssburg, Pa.—Harry Silverman, Arran DeRoy and Elmer A. Barchfield have organized the General Automobile Co. of Pittsburg.

Los Angeles, Cal.—The United States Motor Co. has opened a sub-branch of the Los Angeles branch at Salt Lake under the management of Vernon K. Mailes.

Pittsburg, Pa.—The Arlington Motor Car Co. has discontinued its garage and has opened a salesroom at 6113 Center avenue, east end, where it will handle the Jackson.

Bath, Me.—C. W. Clifford, Jr., has just closed with Morton H. Luce of the New England branch of the Velie, for the agency for the state of Maine, with headquarters in Bath.

Philadelphia, Pa.—The Bartholomew Co. has opened a salesroom at 638 North Broad street, where it has 2,000 feet of floor space, exhibiting the Glide and Avery commercial trucks. This office is the eastern headquarters and the trade in several states is handled from Philadelphia.

Milwaukee, Wis.—The Stegeman Motor Car Co. has been incorporated at Milwaukee, with a capital stock of $40,000. The incorporators are Oscar Stegeman, W. Stegeman and Joseph C. Millman. The general offices are at 315 Germania building, Milwaukee.

Worcester, Mass.—George W. Largess, doing business in this city as the Belmont Auto Co., agent for the Hupmobile, has filed a voluntary bankruptcy petition, with liabilities of $12,550 and assets given at $427. All of his liabilities, according to the petition, are unsecured.

New York.—S. J. Wise & Co., the distributors for the Amplex in this territory, have outgrown their present quarters at the corner of Fifty-eighth street and Broadway, and have rented a large part of the new building on the opposite corner of Broadway and Fifty-eighth street, which will be their headquarters in the future.

St. Louis, Mo.—A. A. Franklin, who has been manager of the Haynes Automobile Co., has withdrawn from that position.

Youngstown, O.—The new firm of Diebel & Manning will build a large garage on West Rayen avenue, and will handle the Overland.

Milwaukee, Wis.—The garage and salesrooms of the Welch Brothers Motor Car Co., at Grand avenue and Seventh street, is being remodeled at a cost of $10,000. The company distributes the Packard and Rauch & Lang electric.

Cincinnati, O.—The Automobile Tire Interlining Co., which was incorporated recently, has opened a place of business at Eighth and Broadway. William Stacey is president, Mark Bruner, vice-president and G. S. McDuff, secretary and treasurer.

Des Moines, Ia.—The Keystone Automobile and Supply Co. has opened for business. John H. Gibson, Vere W. Reynolds and August Gronan head the company. The new concern will have Iowa territory for the Staver-Chicago and the National.

Milwaukee, Wis.—The Diamond Rubber Co., a New York corporation, has entered Wisconsin by filing articles of incorporation and a statement to do business. The Wisconsin interest is named at $1,000.

Worcester, Mass.—A certificate of incorporation has been granted the C. E. Dustin Co. The capital stock of the new company is $6,000. Charles E. Dustin is the president, Samuel T. Hobbs treasurer, and Clarence W. Hobbs, Jr., the third members of the board of directors. The company will handle cars and accessories.

Philadelphia, Pa.—In the section immediately west of the Schuylkill river, a reinforced concrete garage, four stories in height, with a basement, is to be erected at 2314-16-18-20-22 Market street. The building will front 98 feet on Market street, having a depth of 107 feet to Ludlow street, where the structure will have the same frontage. Upon completion it will be occupied by the Locomobile.

Marinette, Wis.—Andrew Heim has opened a garage and repair shop at Marinette and will handle the E-M-F and Flanders.

Columbus, O.—John H. Howald, 172 North Fourth street, central Ohio agent for the Buick and Welch has been given the counties of Delaware, Licking, Fairfield, Pickaway and Perry in addition to those which he controlled last season.

Indianapolis, Ind.—The new salesroom of the Premier Sales Co. has been formally thrown open to the public. The concern is a factory sales branch of the Premier Motor Mfg. Co. It is located at 312-318 North Delaware street.

Boston, Mass.—The Morgan truck is the latest to be represented by an agency in Boston. W. L. Russell, who has the Regal and the Apperson, adding it to his line.

New Haven, Conn.—A permit has been issued to the Holcomb Co. to build a frame addition for its garage at 105 Goffe street.

Boston, Mass.—Contracts were closed in New York last week for the sale of Velie motor cars on the island of Australia and for Montreal, Canada. M. H. Luce, of the New England branch of the Velie Motor Vehicle Co. has also closed contracts for the sale of Velies on the island of Porto Rico.

Baltimore, Md.—The Lambert Auto Co. is having plans prepared for a new home for the Maxwell, National and Hudson cars, which the company represents, at Maryland and Mount Royal avenues. The structure will be 120 feet long and 50 feet deep. The entire first floor will be used as salesrooms.

Grand Rapids, Mich.—George P. Dowling, for the last 2 years manager of the local branch of the Buick Motor Co., has gone to Toledo, Ohio, where he will have charge of a similar branch. Robert McKay, manager of the Battle Creek branch, will have charge of the local office, together with his own work.

Anderson, Ind.—E. C. Hardegan, of Anderson, has patented a floating axle. A company known as the Hardegan Axle Co. has been organized and incorporated in Indianapolis, with an authorized capitalization of $10,000, and a factory will be established immediately. Other directors, besides Mr. Hardegan, are Charles W. Lauer and Herman Wetzel.

Incorporations of New Motor Concerns Reported From Most of the States in the Union Reports Show Numerous Concerns Being Started for Years' Trade

Motor Industry as Reported from Official Sources

Atlantic City, N. J.—Warwick Auto Co., capital stock $4,000; to deal in motor cars and supplies, etc.; incorporators J. C. Drew, M. S. Drew and I. D. Vance.

Boston, Mass.—Burgess Lamp Co., capital stock $1,500; to manufacture and deal in motor car lamps and accessories; incorporators Willis Friedman, H. J. Tonner and E. S. Fishback.

Philadelphia, Pa.—West Penn Automobile Co., capital stock $10,000.

Philadelphia, Pa.—Pittsburg School of Automobile Engineering, capital stock $5,000.

Detroit, Mich.—Woodward Taxicab Co., capital stock $15,000; incorporators Richard Cohen and Victor Cohen.

Birmingham, Ala.—Taxicab and Touring Car Co., capital stock $2,000; to operate a general taxicab business; incorporators E. R. Minheunett, C. C. Jones, and G. H. McLin.

Louisville, Ky.—Marshall-Clark Motorcar Co., capital stock $25,000.

Indianapolis, Ind.—Advance Auto and Machine Co., capital stock $10,000; to manufacture, buy, and sell motor cars; incorporators Henry Kollker, Walter Wheeler and John Diers.

Indianapolis, Ind.—Hardegan Axle Co., capital stock $10,000; to manufacture and sell motor cars and parts; incorporators E. C. Hardegan, C. W. Lauer and Herman Wetzel.

Indianapolis, Ind.—Finch-Freeman Auto Co., capital stock $15,000; incorporators J. O. Finch, H. M. Freeman, W. B. Peterson.

Springfield, Ill.—Great Western Transportation Co., capital stock $100,000; incorporators Samuel B. Geiger, W. M. Trout and H. M. Wilcox.

Racine, Wis.—Advance Motor Car Co., capital stock $750,000; to manufacture, sell and deal in motor boats.

Richmond, Va.—One Buggy Co., Inc., capital stock $50,000; incorporators J. M. Darden, W. S. Braman, and C. E. Holland.

Krit Plant in Detroit in New Hands

Syndicate Headed by Walter Russel Secures Control—Flanders Interested in Merger of Five Concerns

DETROIT, Mich., Jan. 23—The motor shows just closed have not had an absolute monopoly of the spotlight in local motordom. Among the important developments of the last week or 10 days was the taking over of the Krit Motor Car Co., maker of the Krit, by a syndicate of Detroit capitalists, headed by Walter Russel, of the Russel Wheel and Foundry Co. The syndicate takes enough of the stock at par to secure a controlling interest. A complete reorganization has taken place and the company, on February 1, will move from its present factory, at Leib and Wight streets, to the more commodious plant recently vacated by the Owen Motor Car Co., at Mount Elliott avenue and the East Grand boulevard. Practically all of the old officers and directors of the company tendered their resignations, and the new ownership is in full control at this writing.

Moore Is Krit President

W. S. Piggins is succeeded as president of the company by Lawrence Moore, who will also be general manager, giving up his position as sales manager for the Russel Motor Axle Co. Kenneth Crittenden, designer of the Krit, remains as vice-president for the present and also will continue in charge of the engineering department. Edward Crosby Doughty is secretary and treasurer, succeeding F. W. Kanter and B. C. Laughlin. Walter Russel is chairman of the new board of directors.

The company is capitalized at $250,000. The new capital will enable the company to work up the large quantities of raw material on hand, and preparations are being made for a busy season. The fact that the company was such a large purchaser of raw material is said to be largely responsible for the reorganization. With so much money invested in this way, when the slump came last fall the company, according to one of the retiring stockholders, found itself short of ready capital to carry on the business.

The new plant will triple the company's floor space and will mean a large increase in the number of employes. There are now 150 men on the pay roll.

H. H. Crawford has been appointed purchasing agent for the company, leaving a similar position with the Weston-Mott Co., of Flint. A. A. Gloetzner, formerly assistant production manager of the Olds Motor Works and more recently production manager for the Owen Motor Car Co., will become factory superintendent, taking up his new duties at once.

Walter E. Flanders, president and general manager of the E-M-F Co., is the moving spirit in the organization of a new $2,250,000 corporation, known as the Flanders Mfg. Co., which has filed articles with the secretary of state. The new corporation is a merger of five other companies—the Grant & Wood Mfg. Co., of Chelsea, Mich., and the following, all of Pontiac: Pontiac Motorcycle Co., Pontiac Drop Forge Co., Pontiac Foundry Co. and the Vulcan Gear Works. The Pontiac factories comprise nine buildings, just about completed, and the output is principally motor cycles. It is announced, however, that the new corporation will make a specialty of a two-wheeled car, to be known as the bimobile, which is designed for the special benefit of the man of moderate means who cannot afford a regular car. The Grant & Wood Mfg. Co. manufactures automatic screw machines and its products, also steel balls for ball bearings. The Studebakers are prominently identified with the venture.

Officers of the new company will be: President, Robert M. Brownson, formerly secretary-treasurer of the E-M-F Co.; vice-president, Arthur O. Smith, Milwaukee; secretary, James B. Book, Jr., Detroit; treasurer, Harry L. Stanton, Detroit. The directors will be: Walter E. Flanders, Dr. J. B. Book, William T. Barbour, president Detroit Stove Works; Clement Studebaker, Jr., treasurer Studebaker Mfg. Co., South Bend, and of the E-M-F Co.; John T. Shaw, president of the First National Bank, and Arthur O. Smith, Milwaukee. It is evident that the new company will be closely allied with the E-M-F.

It was announced a day or two ago that Captain A. Rawlinson, the famous sportsman, and Lord Northcliffe, both of London, are at the head of a London syndicate that has secured the selling rights for the E-M-F and Flanders cars in Great Britain. The negotiations were completed here last week, Captain Rawlinson coming here from London for that purpose. He spent several days looking over the ocmpany's local plants. Captain Rawlinson formerly was managing director of the English Darracq Automobile Co.

Other Trade News

The capital stock of the Paige-Detroit Motor Car Co. has been increased from $100,000 to $250,000 for the purpose of enlarging the company's facilities. The following officers were elected at the annual meeting of the company, held last week: President, H. M. Jewett; vice-president, E. H. Jewett; treasurer, Gilbert W. Lee; secretary, William B. Cady; general manager, J. F. Bourquin; directors, C. D. Warren, C. H. Hodges, E. D. Stair, Edward A. Skae, Sherman L. Depew, F. O. Paige and the officers. President Jewett is authority for the statement that the company's entire output for 1911 has been contracted for.

All the old officers of the Oliver Motor Car Co. have been reëlected. Louis W. Schimmel is president.

The plant of the Griswold Motor and Body Co., on Commonwealth avenue, was recently damaged by fire to the extent of $60,000, practically covered by insurance. The burned portion will be rebuilt at once, and in the meantime the company is continuing to do business in spite of the handicap.

MEXICO FINDS RUBBER TREE

Mexico City, Mexico., Jan. 21—Much interest has been aroused here over the announcement that a new and heretofore unclassified tree from which a high grade of rubber may be obtained was recently discovered in a remote part of the Territory of Tepic.

The tree in appearance is not at all like the ordinary rubber tree, having more the looks of a horse chestnut tree and bearing nuts like that tree. It is a species of nettle and neither the leaves nor the nuts can be handled without gloves without the nettles burning the skin.

The tree was discovered by Professor John R. Allen, of the University of Michigan, and after some experimenting with the gum obtained from the tree he secured a concession from the Mexican government for a tract of land amounting to some 800,000 acres. A company will be formed for exploiting the product. The crude rubber is worth 75 cents per pound, gold, at the present time.

The new gum is the nearest approach to the Para rubber which has yet been found, it is claimed, and is much easier handled than any of the other rubber products. The trees are tapped for 5 days in succession, after which they are allowed to rest for 3 months before tapping again. The sap which oozes out soon coagulates and all that is necessary is to wash it and it is ready for the market.

At the present time the tract is situated some distance from any railroad, but on the completion of the Southern Pacific line the transportation facilities will be much better and the product can be laid down in New York at a far less cost than the Para rubber, it is stated.